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ABSTRACT

This volume explains the products and processes of the Entry Standards Assessment (ESA)/Basic Skills Brush Up System. The ESA/Basic Skills Brush Up Centers System is a program designed to provide Comprehensive Employment and Training Act (CETA) clients with the math, reading, and writing skills needed to take advantage of job training. Following an introductory description of the system, the ESA, a job skills checklist, is examined. Section 3 shows how the ESA is used by CETA staff. The fourth section describes the Basic Skills Brush Up Centers, the individualized classrooms that provide basic skills instruction, and explains how the centers help clients acquire the basic job-related skills they need. Provided in the final section is a manual describing the process for developing ESA's. (A taxonomy of instructional objectives, originally developed by the Adult Competency Education Project, is appended to the volume. (MN)

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LINKING

MATH, READING AND WRITING

SKILLS TO JOBS

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SECTION I. OVERVIEW

The Employment Training Division of San Mateo County provides training to unemployed persons through CETA funds. ETD funds classroom training, OJT, and Work Experience Training.

Many of our CETA clients lack the math, reading and writing skills needed to take advantage of job training. For one reason or another, their attempts to acquire these skills in the past have led to frustration.

With the assistance of vocational counselors, the CETA clients develop vocational goals and attempt to overcome barriers to full employment.

The Problem

In the past, clients who lacked the basic skills had been sent to semester-length courses which brought up their reading level and increased their skills in general. Clients were in pre-vocational basic skills classes a long time. Many students who wanted jobs dropped out of the program rather than wait for training. Clients were stipended during this period, almost doubling the "cost per placement" for each client. Training classes had openings at different times during the year but many clients were still in basic skills.

The Solution

San Mateo County CETA needed a program which would teach clients the basic skills they needed when they needed them. The relationship between the skill and the job needed to be clear to the client.

In order to develop this program, we would need to identify the exact skills clients actually needed to succeed in job training and to provide individualized instruction to help clients achieve the skills. In this way basic

skill class time would be shortened. Clients could enter at different levels, move at their own pace and exit when they met the standards required. The basic skills program could then be related to the client's desire to become trained and secure a job. This connection would be clear to the client and hopefully would unleash the energy needed to overcome the skill barrier.

But how would this be organized and clear to clients, counselors, job instructors, basic skills instructors and CETA monitors? Clients would be entering at any time during the year. They would possess different levels of skill. They would be preparing to enroll in courses which had different requirements.

A comprehensive bank of math, reading and writing skills provides the organizing principle. This bank of over 400 skills is described in measurable instructional objectives, the Taxonomy of Instructional Objectives. This taxonomy provides the universe from which the job training instructor can select those skills needed to enter the training class - the Entry Standards Assessment (ESA). The taxonomy also provides the structure for the management of the individualized basic skills instruction.

The sections of this book explain the products and processes of the Entry Standards Assessment/Basic Skills Brush Up system developed to meet the needs described above:

Section I introduces the process. Section II examines an Entry Standards Assessment. Section III shows how the Entry Standards Assessment is used by CETA staff.

Section IV describes the Basic Skills Brush Up Centers, the individualized classrooms which provide basic skills instruction, and shows how they help clients acquire the job related basic skills they need.

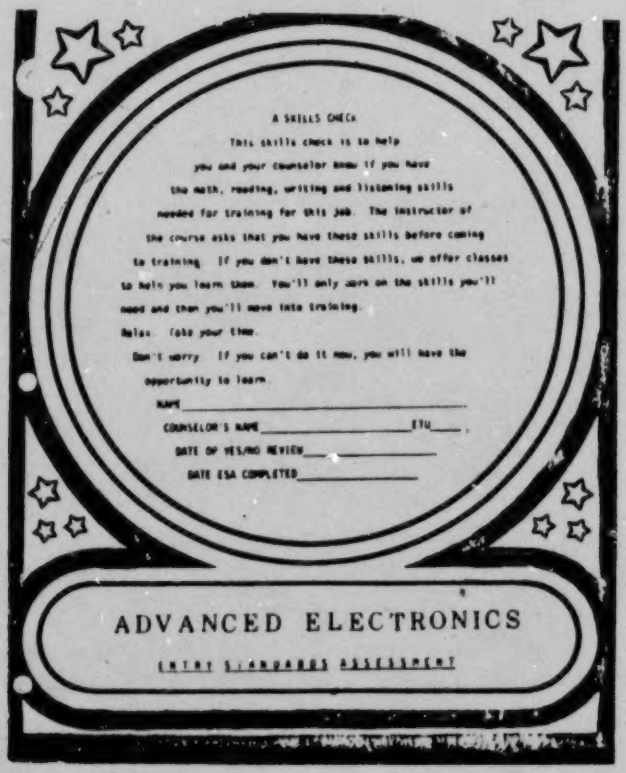
Section V is a manual describing the process for developing Entry Standards Assessments.

SECTION II. WHAT IS AN ENTRY STANDARDS ASSESSMENT?

An Entry Standards Assessment (ESA) is an eight or ten page list of approximately 30 job-related test tasks.

The front page of the ESA explains to the client that it is a "skills check" and that instruction in these skills is available at a BSBU if he/she has difficulty.

It plays down the "test" nature of the assessment. (In this discussion, the word test will be used to mean the Entry Standards Assessments. Test-task will mean job-related performance criteria.)



A SKILLS CHECK

This skills check is to help you and your counselor know if you have the math, reading, writing and listening skills needed for training for this job. The instructor of the course asks that you have these skills before coming to training. If you don't have these skills, we offer classes to help you learn them. You'll only work on the skills you'll need and then you'll move into training.

Relax. Take your time.

Don't worry. If you can't do it now, you will have the opportunity to learn.

NAME_____

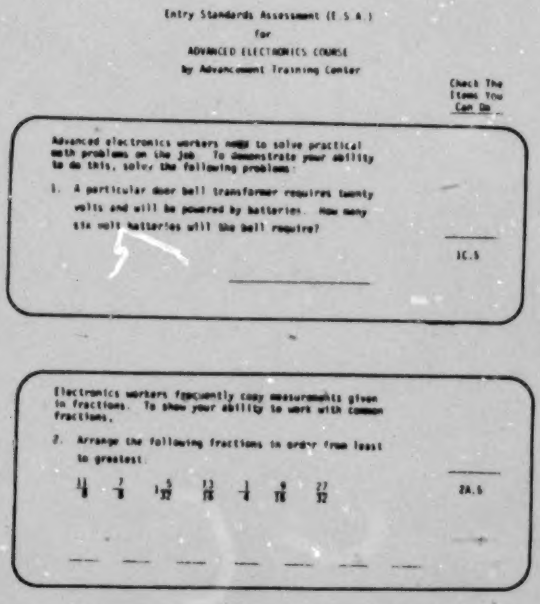
COUNSELOR'S NAME_____ ETU_____

DATE OF YES/NO REVIEW_____

DATE ESA COMPLETED_____

ADVANCED ELECTRONICS

ENTRY STANDARDS ASSESSMENT



Entry Standards Assessment (E.S.A.)
for
ADVANCED ELECTRONICS COURSE
by Advancement Training Center

Check The Items You Can Do

Advanced electronics workers needs to solve practical math problems on the job. To demonstrate your ability to do this, solve the following problems:

1. A particular door bell transformer requires twenty volts and will be powered by batteries. How many six volt batteries will the bell require?

_____

_____ 1C.5

Electronics workers frequently copy measurements given in fractions. To show your ability to work with common fractions,

2. Arrange the following fractions in order from least to greatest.

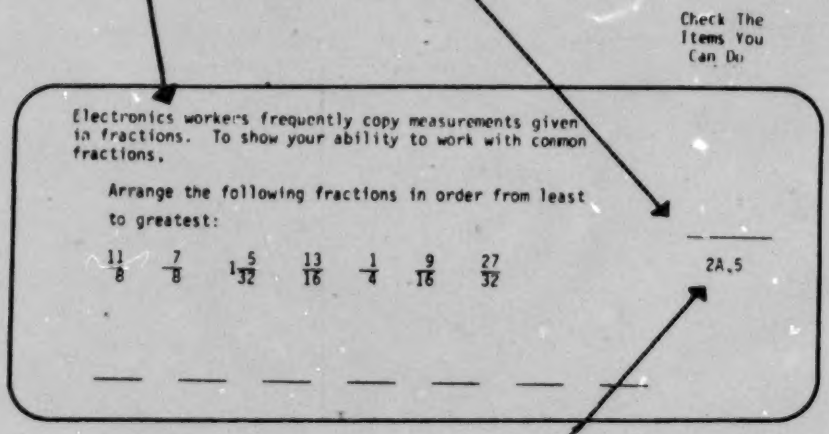
$\frac{11}{8}$ $\frac{7}{8}$ $1\frac{5}{32}$ $\frac{13}{16}$ $\frac{1}{4}$ $\frac{9}{16}$ $\frac{27}{32}$ _____ 2A.6

___ ___ ___ ___ ___ ___ ___

Standards stipulated by Classroom Instructor
Developed by CETA Staff Development Project 3/80

- Each of the test tasks is explained in relationship to the job.

- Each of the test tasks has a space for the client to indicate whether or not he feels he can do the task. This Yes/No Review takes place during early counseling. See Appendix A for further discussion of this process.


Check The Items You Can Do
Electronics workers frequently copy measurements given in fractions. To show your ability to work with common fractions,
Arrange the following fractions in order from least to greatest:
$\frac{11}{8}$ $\frac{7}{8}$ $1\frac{5}{32}$ $\frac{13}{16}$ $\frac{1}{4}$ $\frac{9}{16}$ $\frac{27}{32}$
2A.5

- Most importantly, each of the test tasks is related to an instructional objective in the Taxonomy of Instructional Objectives.

For examole, "2A.5" refers to ---------->

INSTRUCTIONAL OBJECTIVES

UNIT 2- FRACTIONS

NB: Fractions used for test items are to be those which could realistically be expected to be used in occupational work (e.g., one to two digit denominators or even hundreds or thousands). Fractions used in occupational operations generally have denominators such as 2, 3, 4, 5, 10, 25, 100, 1,000, 2,000 and not 7, 9, 37, 1,005 etc. Comparison or reduction of fractions usually involves no more than three fractions and the denominators usually have a measurement relationship such as x/4, x/8, x/16, or x/9 and x/27.

ITEM A- READ AND WRITE

2A.1a In a given diagram or illustration, name the fraction which represents a given number of parts out of a total number of equal parts.

2A.1b Read fractions orally and explain that a fraction represents a given number of parts out of a total number of equal parts.

2A.2 Reduce a fraction to its simplest form (lowest terms).

2A.3 Change improper fractions to mixed numbers and mixed numbers to improper fractions.

2A.4 Write equivalent fractions for a given fraction given a new numerator and denominator.

2A.5 Arrange a set of fractions and/or mixed numbers in ascending or descending order.

2A.6 Write what fractional part one number is of another in simplest form.

2A.7 Find the common denominator of two or more fractions.

2A.8 Given two fractions, write equivalent fractions for each using the common denominator.

ITEM B- ADD AND SUBTRACT

2B.1 Calculate the sum in simplest form of two or three common fractions with like denominators.

2B.2 Calculate the sum in simplest form of two or three common fractions with unlike denominators.

2B.3 Calculate the sum in simplest form of two or three mixed numbers with like and unlike denominators.

"2A.5" here in the Taxonomy of Instructional Objectives. (Appendix B)

Many training programs require 2A.5, arrange a set of fractions and/or mixed numbers in ascending or descending order. Tasks to test this instructional objective are different on ESA's for different training programs. All of them, however, test whether the student can complete this measurable objective.

An ESA, then, includes a selection of items from the Taxonomy of Instructional Objectives.

In general, a taxonomy is an orderly classification of plants and animals according to their presumed natural relationships. The Taxonomy of Instructional Objectives is a listing and classification of instructional objectives stating in measurable terms the MATH and COMMUNICATION skills which the BSBU's are prepared to teach.

This Taxonomy is the backbone of our program!

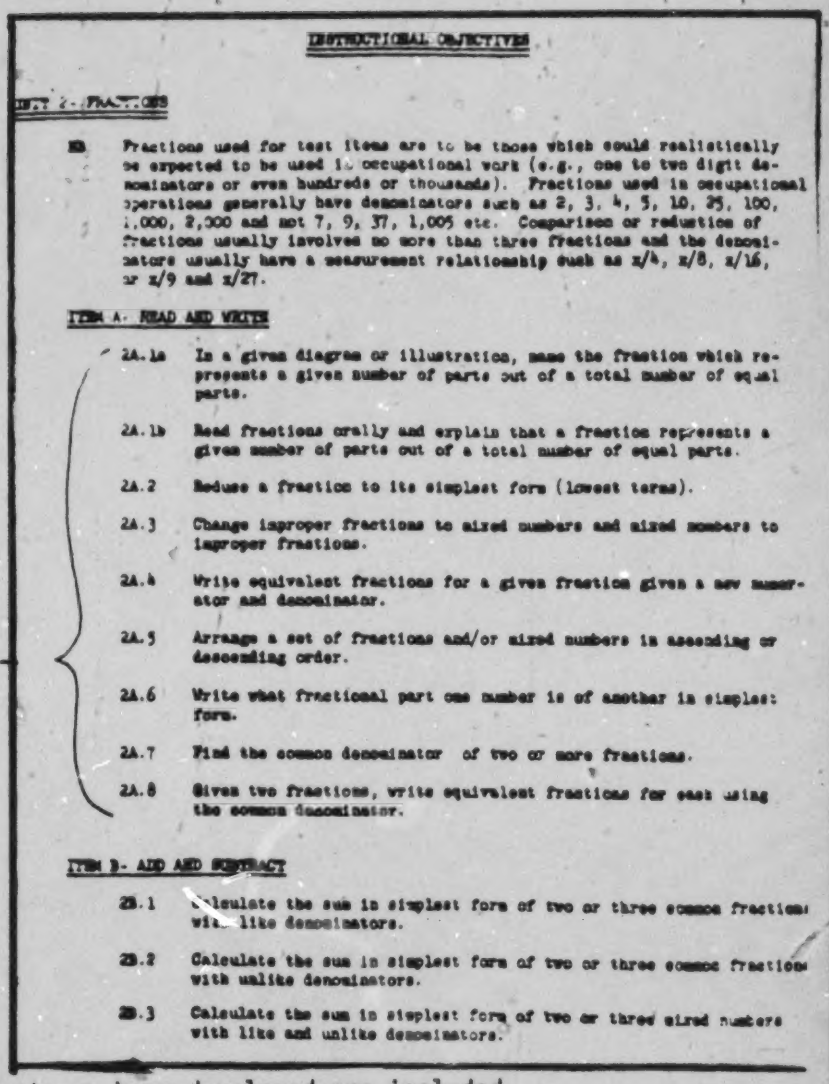
It's the basis for our interview with the job training instructor when we identify the skills needed. It's the basis for the diagnosis and the client's instructional program is described in terms of these instructional objectives.

The Taxonomy provides the language by which job training instructors can communicate specific needs to basic skills instructors, and which counselors can use to inform clients of their skill training needs.

Let's look at a page of the Taxonomy:

- The skills are generally hierarchical--they start easy and get more complex within each category like 2A ----------

- The skills are stated in performance terms.



INSTRUCTIONAL OBJECTIVES

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2A.3 Change improper fractions to mixed numbers and mixed numbers to improper fractions.

2A.4 Write equivalent fractions for a given fraction given a new numerator and denominator.

2A.5 Arrange a set of fractions and/or mixed numbers in ascending or descending order.

2A.6 Write what fractional part one number is of another in simplest form.

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ITEM B- ADD AND SUBTRACT

2B.1 Calculate the sum in simplest form of two or three common fractions with like denominators.

2B.2 Calculate the sum in simplest form of two or three common fractions with unlike denominators.

2B.3 Calculate the sum in simplest form of two or three mixed numbers with like and unlike denominators.

The Entry Standards Assessments we have developed are included in Companion Book I. The Taxonomy of Instructional Objectives is included as Appendix B.

SECTION III. HOW ARE ESA'S USED?

The Entry Standards Assessment is used as information:

- to help the job training instructor convey to the counselor the skill standards needed to enter and succeed in the job training.

- to help the counselor convey to the client the skill standards needed to enter job training.

- to help the counselor convey a "picture" of the job to the client.
  (In explaining how the skills are used on job, the counselor is sharing a lot of information about the job.)

The ESA is used as an assessment:

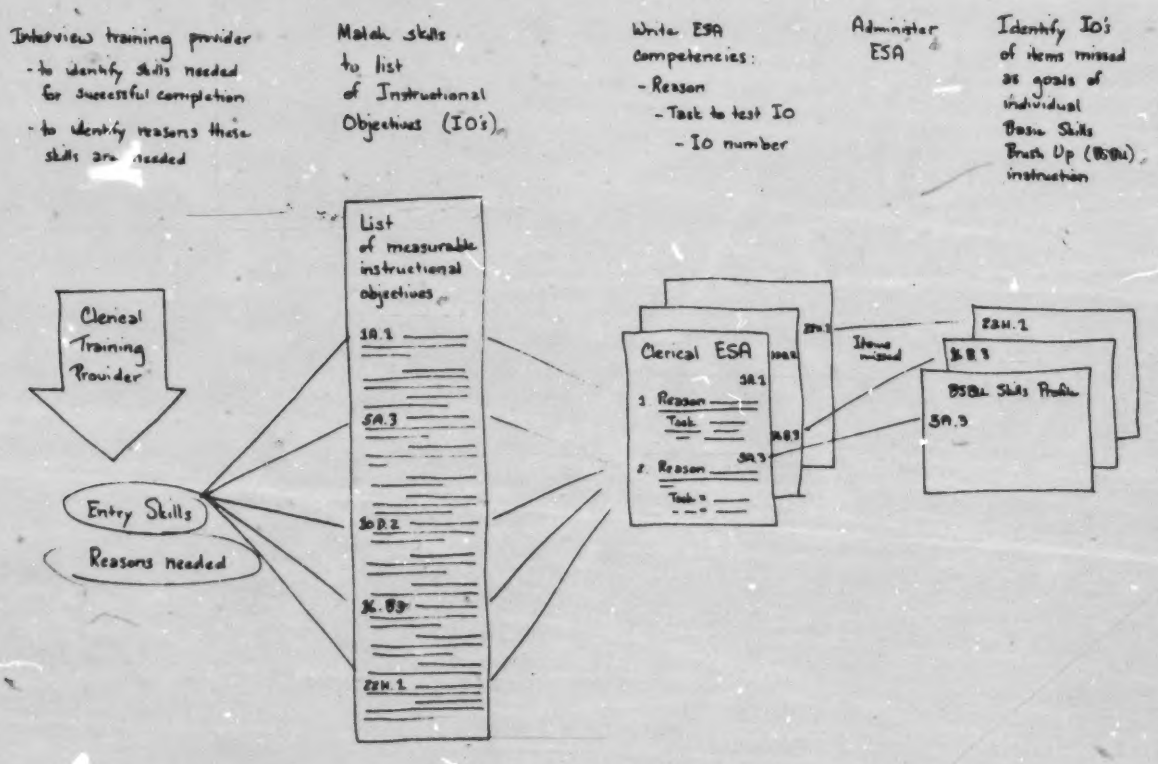
- to help the client recognize whether or not he has the skills needed to enter training.

- to help the counselor identify the client who is likely to succeed in a particular training.

- to help the counselor get a rough feel for how long a client might be in BSBU.

The Basic Skills Brush Up instructor reviews the ESA with the client, noting the skills he has been able to demonstrate. The instructor begins the diagnosis with the test tasks the client was not able to complete. The basic skills instructional program is developed as a result.

HOW THE ESA LINKS BASIC SKILLS TO JOB TRAINING



The ESA is used by various people in the system

Clients use the ESA's

- to get a rough idea of what's required to enter different training programs.
- to learn about different jobs in Career Exploration. ESA's from different training programs are shown to the client so that the client can get an idea of some of the specific tasks people working in that job do.

(Since the ESA's are criterion referenced and since the counselor can substitute other equal items*, there is no danger in using the ESA's in this way.)

* See Appendix C for a description of how this is done—

Counselors use the ESA's

- to give clients a specific idea of what skills are required to enter the training program they are interested in. See Appendix A for an explanation of the Yes/No Review.

- to find out if a person is ready right now to enter training.

- to identify the specific skills a person needs if he/she is not ready for training.

Job Training Instructors use the ESA's

to communicate to the counselor - in very exact terms - the skills clients need.

BSBU Instructors use the ESA's

- as the starting point for the diagnosis of the client's basic skills needs.
- as a source of job-related reasons for why the skill is needed in training or on the job.
- as a posttest - to demonstrate to the client that he/she can now do the skill he couldn't do a few weeks ago.

ETD Monitors and BSBU Supervisors can use the ESA's

- to see at a glance that each BSBU participant has
  - a job-related program
  - a program that is related to acquiring a specific, demonstrable skill.
- to get a handle on what exact skills clients generally need.

The Employment Training and Division (ETD)

can use the ESA's to control the flow of clients into training.

ETD can encourage training providers to raise or lower the standards. That is, increase or decrease the number of skills which BSBU will teach. This enables t he training units to move more clients through the job specific aspect of their training more quickly.

SECTION IV. HOW THE BASIC SKILLS BRUSH UP CENTERS PROVIDE INDIVIDUALIZED, JOB-RELATED BASIC SKILLS INSTRUCTIONAL PROGRAMS

A. Overview

The Basic Skill Brush Up Centers (BSBU) serve fifteen to twenty students at one time. The Center is staffed by an instructor and an aide, generally a paraprofessional. The BSBU uses the space of a large classroom and provides individual work stations as well as tables for small group instruction. Chalkboards, graphics, charts and other job-training related materials cover the walls.

An important element of the BSBU is the Student Folder. The Folder contains the Skills Profile;* a listing of the skills needed for the job training course. The Skills Profile records which skills the student has demonstrated and which skills the students needs work on - the objectives for the instructional program. A four drawer file cabinet contains pretests, instructional exercises, and posttests for each of the instructional objectives in the Taxonomy. The materials cover math, reading and writing.

B. The Basic Skill Brush Up Instructional Management System

1. Diagnosis

Once the client has shown that he needs instruction on some basic skills by being unable to carryout the test tasks of the Entry Standards Assessment, he is referred to the BSBU Instructor. The instructor goes through the ESA step by step with the student and works back from the incorrect item to less complex

*See Appendix D for the Clerical ESA Skills Profile

Instructional Objectives to identify the instructional level. The Diagnostic Book* provides a structured procedure which leads the instructor from the tested item to the skills which are likely to be prerequisite to it. The Skills Profile for any ESA lists both the Instructional Objectives tested and the skills prerequisite to them. The instructor records on the Skill Profile all the skills which the student can demonstrate. The remaining skills and their prerequisites become the student's program.

The daily instructional plan for each student is noted in his folder. Students learn to obtain exercises from the file of exercises and to correct their own work. The instructor plans their work, helps when they have problems and assesses them when they feel ready to "pass" an Instructional Objective. The instructor teaches short classes to small groups of students and locates and develops instructional materials.

C. Reporting

Because the student's program is focussed on exact skills, progress through BSBU is rapid. On the average students are enrolled for six weeks, 180 hours of instruction.

*Sample pages are included as Appendix E.

The Basic Skill Brush Up is preparation for the job training aspect of their program so the reporting demands on the instructor are great. The BSBU instructor needs to chart the student's progress so that the student sees where he is going and why he is studying a particular skill. This is accomplished by use of the Daily Assignment Sheet and the Skills Profile. The BSBU instructor also needs to report to the student's counselor. Once the diagnosis has been completed, the Skills Profile informs the counselor of the expected length of the instructional program.

SECTION V. HOW IS AN ESA DEVELOPED?

Written in the form of a how-to manual, this section describes the process for identifying the basic skills needed for job training and for assembling the data into an Entry Standards Assessment.

A. PREPARATION

1. Review this book to this point. Understand the components of the system.

   * You want to identify 30 or 40 job-related test tasks which accurately reflect the math, reading and writing skills a CETA client needs to enter training.

   * You don't want the test tasks to be more difficult than the training class demands but you don't want to miss anything and have the client enter training poorly prepared.

2. Familiarize yourself with the Taxonomy.

   Appendix F includes an exercise to help you become familiar with the Taxonomy. Knowing the Taxonomy thoroughly is essential. If you don't know your way around it, the job will seem huge and the resulting ESA will probably be poor.

3. Familiarize yourself with the Entry Standards Questionnaire (ESQ). Appendix G

   - Note that each question is keyed to a Taxonomy item.
   - Note that the ESQ asks questions pertaining only to the top skills in a skill cluster. (Not all Taxonomy items are represented by questions.)

   Compare the ESQ with the Taxonomy.

   Make notes on the ESQ if it will help.

4. Make your initial contact with the training provider.

Explain the BSBU system.

See "Linking Skills to Jobs" (Appendix H)

Explain the purpose of the ESA.

Make an appointment to spend one hour with the instructor. (Try not to work with the training site supervisor--the instructor is the best source of classroom information and what is really required to succeed in the training.)

Ask the instructor to bring to your interview all the materials the client must deal with in the class:

- Texts
- Reference materials
- Handouts
- Tests
- Charts, graphs

You'll want to see them all.

B. INITIAL INTERVIEW

1. Bring with you

- the Taxonomy,
- the most closely related ESA, and
- the Entry Standards Questionnaire

2. Review with the training instructor

- How the BSBU's work
- How the ESA's work

Sit with the instructor so that both of you are looking at the pages of the ESQ (or b ing a copy for the instructor to read along). You want the instructor to see the examples and to be able to focus on your questions.

Ask the instructor each of the questions in the Entry Standards Questionnaire (It is a structured questionnaire).

The examples will be helpful to you in writing the test items. They also help you find out if you and the instructor are talking about the same skill.

If the instructor wants to add a skill, review the Taxonomy to see if an instructional objective exists which represents the skill or comes close. If it does, OK, note it. Get it specific and get the job related task.

Record the instructor's answers on the pages. Ask the instructor to explain the job related uses of the tasks.

Be patient. Most teachers have never thought the way you are asking them to think. Be patient and be helpful. Suggest possibilities.

Be sensitive to the fact that teachers might not readily understand some of the language you are using. They might not understand the need for making some of the distinctions you'll be making.

Keep repeating that if the training instructor teaches a skill, or if the skill is not needed in training or on the job at all, then the skill should not be included on the ESA.

If an Instructional Objective doesn't exist, make a note to call the BSBU instructors and ask if one could/ should be developed. Get one of them to help write it. They are the ones who will teach to it.

C. IDENTIFY THE INSTRUCTIONAL OBJECTIVES THE ESA WILL TEST.

1. Take your notes from each page of the ESQ on which the instructor requested a skill and turn to the Taxonomy section dealing with that skill. (Use the code in the lower lefthand corner of the ESQ page.) Locate, if you can, an Instructional Objective which expresses the skill exactly.

   If you locate one, enter it on the "Instructional Objectives To Be Tested" sheet which follows this page. If you can't locate one, you'll have to evaluate whether one should be developed or to drop it from the ESA.

Make sure that you select the most closely matching Instructional Objective. Go through your notes. List all the Instructional Objectives you might want to test for.

INSTRUCTIONAL OBJECTIVES TO BE TESTED

MATH	LANGUAGE

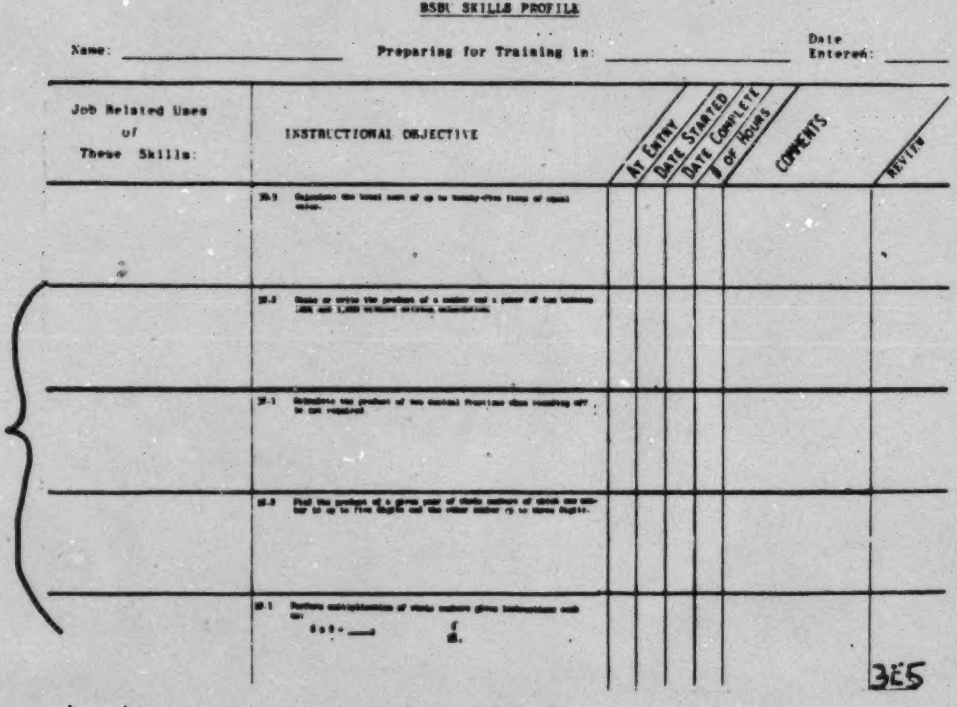
2. Problems may arise. You'll have to phone the training instructor and get more information. You'll want to sit back and think about the overall purpose of the ESA's. You might seek consultation from the BSBU instructors. You might look over the previously developed ESA's and see what that stimulates.

3. Once you've got the list complete, review it to see if there are any skills which are very similar to one another or if one skill includes another as a prerequisite.

   You don't want to test anything twice, but you don't want to omit a skill area if it is used either.

If you need help identifying what skills are prerequisite to one another, go to the Diagnostic Book. This book lists the skills which are prerequisite to each Instructional Objective. Locate the Instructional Objective code in the lower right hand corner and read the prerequisites to the major skill.

The major skill is listed first. The prerequisites are listed under it.



BSBC SKILLS PROFILE

Name: _____ Preparing for Training in: _____ Date Entered: _____

Job Related Uses of These Skills:	INSTRUCTIONAL OBJECTIVE	At Entry	Date Started	Date Complete	# of Hours	COMMENTS	REVIEW
Major Skill:							
Prerequisites:							

365

D. ASSEMBLE A DRAFT OF THE ESA.

Now that you've got a somewhat reduced list of Instructional Objectives to be tested, find out what test items have already been developed for those IO's.

To do this refer to the Book of Items Used (Appendix I) and the Back Up Items Book (Appendix J). The Book of Items Used includes all of the items used on all the ESA's arranged by code number. It's set up in the same order as the Taxonomy.

Pull from the book and copy the task which tests your Instructional Objectives in the most suitable way.

This set of pages plus any test items you've written will constitute the first draft of the ESA.

The tasks are not described in a context that pertains to the class you are preparing the ESA for.

E. WRITE THE TEST TASKS IN JOB CONTEXT

Now go back and rewrite the stem, the introductary portion of each item.

The stem contains the job information and supplies the person with a practical reason for learning the skill.

Use the material you've gathered from the instructor to make the items job related.

F. REVIEW THE TEST WITH THE TRAINING INSTRUCTOR

Arrange to sit with the training instructor and review the ESA, item by item.

Remind the instructor that clients must pass all items (100%) prior to entry to the class.

If the instructor wants to teach the skill, the ESA should not contain an item relating to that skill.

Remind the instructor that he or she might want to set other job-related, non-academic criteria for entry but that they must communicate those criteria to the counselors directly--those criteria are not part of the ESA.

G. DEVELOP BACK-UP ITEMS

For each instructional objective used in any of the ESA's there are two Back-Up Items included in the Back-Up Items Book.

In administering the ESA, the counselor may see that the client is just rusty at some skills and could do them with a quick review.

In these cases, the counselor is encouraged to coach the client and then to use the Back-Up Items to demonstrate whether the coaching has taken or the person still lacks the skill.

Back-up items have been written for all items used in the ESA's. If you are adding items relating to Instructional Objectives not previously used, you will need to write Back-Up Items for those Instructional Objectives.

H. WRITE ANSWER KEYS

Prepare answer keys to the ESA and circulate to those who will be using them.

Appendices

A. Yes/No Review

B. The Taxonomy

C. Using the Back-Up-Items Book

D. Clerical Skills Profile

E. Sample Pages from the Diagnostic Book

F. Exercise to help you become familiar with the Taxonomy

G. Entry Standards Questionnaire

H. "Linking Skills to Jobs"

I. Book of Items Used

J. Back-Up-Items Book

Companion Book

The Book of Entry Standards Assessments (ESA's)

YES/NO REVIEW

The YES/No REVIEW gives a counselor a short - non-testing (and therefore non threatening) way of establishing whether an ESA is way over the head of the client. This helps the counselor avoid putting the client through a needless and detailed demonstration of the client's inability.

During the YES/NO REVIEW, the counselor asks the client to read through the ESA and write "Yes" next to those items he feels he can do and "No" next to those he can't do. (Research tells us that people are fairly accurate when asked to state whethor or not they can do something.)

If it looks like the client is not going to be able to complete many of the items, then the counselor can let him know that the academic preparation might be extensive or begin to talk in terms of training which is less academically demanding.

A.C.E. TAXONOMY OF INSTRUCTIONAL OBJECTIVES*

as modified and adapted by:

Michael Malone

with contributions by:

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(organization and writing of basic reading measurable objectives)

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*Generic Skills, Kawula, Walter D., and Smith, Arthur De W., Training Research and Development Station, Department of Manpower and Immigration, Prince Albert, Saskatchewan, 1975.

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INSTRUCTIONAL OBJECTIVES

UNIT 1 - WHOLE NUMBERS

ITEM A - READ, WRITE AND COUNT

1A.1 Given a series of numbers in numeral form (e.g., 10, 20, 30) be able to copy series in hand-written form with 100% accuracy.

1A.2 Identify place value of digits in a given whole number with up to seven digits.

1A.3 Read a given whole number less than ten million and write its name in words.

1A.4 Write a whole number less than ten million given the word name of the number.

1A.5 Count a set of up to 100 objects and state or write the number of objects counted.

1A.6 Arrange a set of whole numbers in ascending or descending order.

ITEM B - ADD AND SUBTRACT

1B.1 Perform additions of whole numbers given instructions such as:

What is the total of 8 and 5?
8 plus 5 is____;
Find the sum of 8 and 5;
Add 8 and 5;

8 + 5 =_____;

$$\begin{array}{r} 8 \\ +\ 5 \\ \hline \end{array}$$

1B.2 Find the sum of a set of whole numbers of 1-5 digits including cases where carrying is required.

1B.3 Perform subtraction of whole numbers given instructions such as:

8 minus 5 is____;
Subtract 5 from 8;
Find the difference of 8 and 5;
8 - 5 =____;

If you had 8 and gave away 5, you would have ____;

$$\begin{array}{r} 8 \\ -\ 5 \\ \hline \end{array}$$

1B.4 Find the difference of two 1-5 digit numbers including cases where borrowing is required.

1B.5 Solve a routine word problem using subtraction and/or addition of whole numbers.

1B.6 Perform the above operations with the aid of a calculator.

INSTRUCTIONAL OBJECTIVES

ITEM C- MULTIPLY AND DIVIDE

1C.1 Perform multiplication of whole numbers given instructions such as:

6 times 2 is ____;
Six two's are ____;
The product of 6 and 2 is ____;

$6 \times 2 = \_\_\_\_$;

$\begin{array}{r} 6 \\ \times 2 \\ \hline \end{array}$

1C.2 Find the product of a given pair of whole numbers of which one number is up to five digits and the other number up to three digits.

1C.3 Perform division of two simple whole numbers (no remainder) given instructions such as:

6 divided by 2 is ____.
2 into 6 goes ____ times.
The quotient of 6 divided by 2 is ____;

$6 \div 2 = \_\_\_\_$;

$2\overline{)6} = \_\_\_\_$;

$\frac{6}{2} = \_\_\_\_$.

1C.4 Find quotients of 1-5 digit dividends and 1-3 digit divisors includi cases where there are remainders.

1C.5 Solve routine word problems using multiplication and/or division of whole numbers.

1C.6 Perform the above operations with the aid of a calculator.

ITEM D- COMBINATION OF FUNCTION PROBLEMS

1D.1 Use addition, subtraction, multiplication or division, as appropriate, in the solution of problems involving a combination of two or more functions with whole numbers.

ITEM E- ROUND OFF

1E.1 Round off a number to the nearest ten, hundred, thousand, ten thousand or hundred thousand.

INSTRUCTIONAL OBJECTIVES

UNIT 2- FRACTIONS

NB: Fractions used for test items are to be those which could realistically be expected to be used in occupational work (e.g., one to two digit denominators or even hundreds or thousands). Fractions used in occupational operations generally have denominators such as 2, 3, 4, 5, 10, 25, 100, 1,000, 2,000 and not 7, 9, 37, 1,005 etc. Comparison or reduction of fractions usually involves no more than three fractions and the denominators usually have a measurement relationship such as x/4, x/8, x/16, or x/9 and x/27.

ITEM A- READ AND WRITE

2A.1a In a given diagram or illustration, name the fraction which represents a given number of parts out of a total number of equal parts.

2A.1b Read fractions orally and explain that a fraction represents a given number of parts out of a total number of equal parts.

2A.2 Reduce a fraction to its simplest form (lowest terms).

2A.3 Change improper fractions to mixed numbers and mixed numbers to improper fractions.

2A.4 Write equivalent fractions for a given fraction given a new numerator and denominator.

2A.5 Arrange a set of fractions and/or mixed numbers in ascending or descending order.

2A.6 Write what fractional part one number is of another in simplest form.

2A.7 Find the common denominator of two or more fractions.

2A.8 Given two fractions, write equivalent fractions for each using the common denominator.

ITEM B- ADD AND SUBTRACT

2B.1 Calculate the sum in simplest form of two or three common fractions with like denominators.

2B.2 Calculate the sum in simplest form of two or three common fractions with unlike denominators.

2B.3 Calculate the sum in simplest form of two or three mixed numbers with like and unlike denominators.

INSTRUCTIONAL OBJECTIVES

2B.4 Calculate the sum in simplest form of two or three numbers which include at least one proper fraction and one mixed number.

2B.5 Calculate the difference in simplest form of two common fractions with like denominators.

2B.6 Calculate the difference in simplest form of two common fractions with unlike denominators.

2B.7 Calculate the difference in simplest form of two mixed numbers which have <u>like</u> denominators including cases where borrowing is required.

2B.8 Calculate the difference in simplest form of two mixed numbers which have <u>unlike</u> denominators including cases where borrowing is required.

2B.9 Solve a routine word problem using addition and/or subtraction of fractional and/or mixed numbers.

2B.10 Perform the above operations with the aid of a calculator.

ITEM C- MULTIPLY AND DIVIDE

2C.1 Calculate the product in simplest form of:

a. a common fraction and a whole number;
b. two common fractions.

2C.2 Calculate the product in simplest form of:

a. a mixed number and a whole number;
b. two mixed numbers.

2C.3 Calculate the product in simplest form of two or three numbers which include at least one common fraction and one mixed number.

2C.4 Calculate the quotient in simplest form of:

a. a common fraction divided by a whole number;
b. two common fractions;
c. a whole number divided by a common fraction.

2C.5 Calculate the quotient in simplest form of:

a. a mixed number divided by a whole number and vice versa;
b. a mixed number divided by a common fraction and vice versa;
c. two mixed numbers.

2C.6 Solve a routine word problem using multiplication and/or division of fractional and/or mixed numbers.

2C.7 Perform the above operations with the aid of a calculator.

ITEM D- COMBINATION OF FUNCTION PROBLEMS

2D.1 Use addition, subtraction, multiplication or division, as appropriate, in the solution of problems involving a combination of two or more functions with fractional and/or mixed numbers.

UNIT 3- DECIMALS

NB: Decimals used for test items are to be those which could realistically be expected to be used in occupational work (e.g., no more than three zeros required to position the decimal (.0001) or no more than four digits after the decimal is rounded off (1.7824).

ITEM A- READ, WRITE AND COUNT

3A.1 Read a given 1-4 place decimal fraction and write its name in words.

3A.2 Write a 1-4 place decimal fraction given the word name of the number.

3A.3 Arrange a set of decimal fractions in ascending or descending order.

ITEM B- ADD AND SUBTRACT

3B.1 Calculate the sum of a set of decimal fractions.

3B.2 Calculate the difference of two decimal fractions.

3B.3 Solve a routine word problem using addition and/or subtraction of decimal fractions.

3B.4 Perform the above operations with the aid of a calculator.

INSTRUCTIONAL OBJECTIVES

ITEM C- MULTIPLY AND DIVIDE

3C.1 Calculate the product of two decimal fractions when rounding off is (a) required, and (b) not required.

3C.2 State or write the product of a number and a power of ten between .001 and 1,000 without written calculation.

3C.3 Calculate to a given number of decimal places; the quotient of a whole number divided into:

a. a whole number larger than the divisor;
b. a whole number smaller than the divisor;
c. a decimal fraction.

3C.4 Calculate to a given number of decimal places, the quotient of a decimal fraction divided into:

a. a decimal fraction;
b. a whole number.

3C.5 State or write the quotient of a number divided by a power of ten between .001 and 1,000 without written calculation.

3C.6 Solve a routine word problem using multiplication and/or division of decimals.

3C.7 Excepting objectives 2 and 5, perform the above operations with the aid of a calculator.

ITEM D- ROUND OFF

3D.1 Round off a decimal fraction to the nearest tenth, hundredth, thousandth, or ten-thousandth.

ITEM E- DOLLARS AND CENTS

3E.1 Read a given value less than $10,000,000.00 and write or state its name in words.

3E.2 Write a value less than $10,000,000.00 given the word name of the amount.

3E.3 Add columns of dollars and cents values including amounts from $ .01 to $9,999.99.

3E.4 Subtract one amount of money from another with values up to $10,000.00.

3E.5 Calculate the total cost of up to twenty-five items of equal value.

3E.6 Calculate the unit cost of an item when given the total cost of up to twenty-five of the same items.

3E.7 Round off dollars and cents amounts to the nearest cent.

3E.8 Round off an amount of money to the nearest dollar, ten dollars, hundred dollars or thousand dollars.

3E.9 Perform objectives 3 to 6 with the aid of a calculator.

3E.10 Given an amount of money and the cost of items purchased, make change.

3E.11 Solve practical problems involving addition and subtraction of dollars and cents amounts.

3E.12 Solve practical problems involving the use of multiplication and division of dollars and cents amounts.

ITEM F- COMBINATION OF FUNCTION PROBLEMS

3F.1 Use addition, subtraction, multiplication or division, as appropriate, in the solution of problems involving a combination of two or more functions with decimal fractions.

3F.2 Use addition, subtraction, multiplication or division. as appropriate, in the solution of problems involving a combination of two or more functions with dollars and cents amounts.

UNIT 4- PERCENT

ITEM A- READ AND WRITE

4A.1 Identify a percent as equivalent to a fraction with 100 as the denominator.

4A.2 Identify the percent symbol (%) by writing in words a given percentage.

INSTRUCTIONAL OBJECTIVES

ITEM B- PERCENTAGE CALCULATION

4B.1 Calculate a percent of a number of the following types:

5% of 170 = _____;
5.7% of 170 = _____;
5.7% of 17.43 = _____.

4B.2 Calculate percent problems like determining what percent one number is of another such as:

12 is _____% of 60?
12.5 is _____% of 60?
12 is _____% of 60.5?

4B.3 Calculate percent problems like determining a number when a percent of it is known such as:

5% of _____ = 60;
5.5% of _____ = 60;
5.5% of _____ = 60.5.

ITEM C-WORD PROBLEMS

4C.1 Solve a routine word problem involving the calculation of the percent of a number.

4C.2 Solve a routine word problem involving the calculation of a rate.

4C.3 Solve a routine word problem involving the calculation of the base.

4C.4 Identify <u>interest</u> as an amount of money paid for the use of money, <u>principle</u> as the amount of money being used, <u>rate</u> as the percent of the principle to be paid for the use of it, and <u>time</u> as the amount of time the principle is to be used.

4C.5 Solve simple interest problems.

INSTRUCTIONAL OBJECTIVES

UNIT 5- MIXED OPERATIONS

ITEM A- EQUIVALENTS

5A.1 Convert:

a. a common fraction or mixed number to a decimal fraction;
b. a decimal fraction to a common fraction or mixed number.

5A.2 Convert:

a. a percent to a fraction;
b. a fraction to a percent.

5A.3 Convert:

a. a percent to a decimal;
b. a decimal to a percent.

5A.4 Use standard tables to convert:

a. a fraction to a percent;
b. a percent to a fraction.

5A.5 Write from memory (without written calculation):

a. the decimal and percent equivalents of 1/2 , 1/3 , 1/4 , 2/3, 3/4, 1/5, 2/5, 3/5, and 4/5;
b. the conversion fraction equivalents of .5, .33 1/3, .66 2/3, .25, .75, .2, .4, .6, and .8;
c. the fraction equivalents of 50%, 33 1/3%, 66 2/3%, 25%, 75%, 20%, 40%, 60%, and 80%.

ITEM B- PROBLEMS WITH MIXED FUNCTIONS WITH VARIED TYPES OF NUMBERS

5B.1 Determine the average of a group of numbers.

5B.2 Solve a practical problem involving the calculation of the average of a group of numbers.

5B.3 Simplify an expression involving addition and subtraction of whole numbers.

5B.4 Simplify an expression involving addition and/or subtraction and multiplication and/or division of whole numbers or fractions.

5B.5 Simplify an expression which requires the removal of parentheses.

5B.6 Simplify an expression in which the numerator and/or denominator of a fraction is a sum, difference, product, or quotient of two whole numbers.

INSTRUCTIONAL OBJECTIVES

5B.7 State the order in which various types of operations should be performed.

5B.8 Solve a routine word problem using addition, subtraction, multiplication, and/or division of decimal fractions and common fractions or mixed numbers.

5B.9 Write a mathematical expression relating the facts in a given problem and then simplify that expression.

5B.10 Given word problems appropriate to a selected occupation, be able to: Select arithmetic functions to be performed; determine the order in which they are to be done; and obtain the required solution.

5B.11 Given appropriate occupational arithmetic calculation requirements the student will be able to perform the operations using common short cut methods.

ITEM C- RATIO

5C.1 Identify comparisons of two numbers in forms such as a:b, "a is to b", or "a parts to b parts", as ratios.

5C.2 State or write in simplest form (lowest terms) a ratio of two numbers or items in the form:

a. a:b; b. $\frac{a}{b}$.

5C.3 Write a ratio, given a description of two numbers or items, one of which must be determined by addition or subtraction of the numbers in a given ratio.

ITEM D- PROPORTION

5D.1 Identify an equality of two ratios in the form of: a:b = c:d, $\frac{a}{b} = \frac{c}{d}$, "a is to b as c is to d", or "a parts to b parts is the same as c parts to d parts", etc., as a proportion.

5D.2 Calculate the unknown number given three numbers in a proportion.

5D.3 Calculate a number when a fraction of it is known, using the proportion method.

5D.4 Solve a routine word problem involving the solution of a proportion.

ITEM E- DISTANCE, TIME, RATE

5E.1 Solve problems involving the calculation of distance, time or rate.

INSTRUCTIONAL OBJECTIVES

UNIT 6- MEASURE, ESTIMATE, CALCULATE

NB: 1. Excessively small or large measurement estimates are not required. Extremes such as seconds/months, less than one ounce/over 100 pounds, less than a quarter inch /over fifty feet, should be avoided.

2. Students should be allowed to use the senses of sight and touch when estimating.

ITEM A- AREAS

6A.1 Identify area as the measurement of the surface of a figure and state units used (sq. in., sq. ft., sq. yd., sq. mi.).

6A.2 Calculate the area of a given square.

6A.3 Calculate the area of a given rectangle.

6A.4 Determine the altitude of a given triangle.

6A.4a Calculate the area of a given triangle.

6A.5 Calculate the area of a given circle.

6A.6 Solve a practical problem involving area calculations of a square, rectangle, triangle, and/or circle.

6A.7 Estimate the area of common rectangular or square objects within 25% of the actual area.

6A.8 Calculate the area of a regular polygon of up to ten sides.

6A.9 Solve a practical problem involving the area of an irregular polygon.

ITEM B- PERIMETERS

6B.1 Identify perimeter as the length of the outer boundary of a plane figure and identify the units used as inches, feet, yards, etc.

6B.2 Calculate the perimeter of a given rectangle, square, or triangle.

6B.3 Identify π as a constant equal to c/d for all circles and identify its approximate value as 3 1/7 or 3.14.

6B.4 Calculate the circumference of a circle given:

a. its radius;
b. its diameter.

6B.5 Solve a routine word problem involving perimeter.

6B.6 Estimate the perimeter of an object to within 25% of the actual length.

6B.7 Solve a practical problem involving the calculation of the perimeter of an irregular polygon.

ITEM C- VOLUMES

6C.1 Calculate the volume of a given rectangular solid (including cubes).

6C.2 Calculate the volume of a given cylinder.

6C.3 Calculate the number of board-feet (FBM) in a stated piece or in pieces of lumber.

6C.4 Calculate the volumes of cones, pyramids, and spheres.

6C.5 Solve practical problems involving volume calculations of various solids.

6C.6 Cubic Measure:
Estimate the cubic measurement of a common object or space to within 50% of the actual measurement.
The common object or space to be a reasonable size (small as a book to as large as a classroom) and to be square or rectangular in configuration.

ITEM D- CAPACITY

6D.1 Add and subtract units of liquid measure including cases where re-grouping is required.

6D.2 Estimate the liquid contents or capacity of common containers to within 50% of the actual content or capacity.

6D.3 Measure liquid content or capacity of a container to within one unit of the scale on the measuring instrument.

ITEM E- WEIGHT

6E.1 Add and subtract weight measures including cases where borrowing is required.

6E.2 Weigh common objects on balance or spring loaded scales, correct to within one unit of the scale readings.

6E.3 From visual, kinesthetic, and tactile perception, and with immediate subsequent feedback, estimate the weight of various items of different shape, size, and composition (e.g., chair, table, book), to within 20% of actual weight.

ITEM F- DISTANCE

6F.1 Add and subtract units of distance including cases where borrowing is required.

6F.2 Measure a given distance or one dimension of an object with a ruler or tape measure, correct to within one unit of the scale reading.

6F.3 Estimate the length, width, height, or distance between objects, to within 20% of actual measurement, in cases such as the following:

a. dimensions of a book, box, desk, room or building;
b. distances up to 200 yards.

ITEM G- TIME

6G.1 Subtract 12-hour clock times including cases where borrowing is required.

6G.2 Measure the actual duration of time expended to perform routine functions, correct to within 5% of actual duration.

6G.3 Add a time interval to a 12-hour clock time.

6G.4 Subtract a time interval from a 12-hour clock time.

6G.5 Multiply given units by time intervals (e.g., 3 people times 4 hours and 35 minutes).

6G.6 Given hours of work and rates of work, calculate hours per week and hours per month.

6G.7 Estimate the duration of time actually required to perform routine functions, to within 50% of the actual time.

INSTRUCTIONAL OBJECTIVES

ITEM E- COSTS

6E.1 Given unit costs for material, wage or salary rates for labor, the total number of items, the hours/days of work, calculate total costs.

6E.2 Given a simple and familiar job, estimate the materials and labor requirements in units of material and hours/days of work.

6E.3 Given a simple and familiar job, unit costs, and wage or salary rates, estimate the units of material and hours/days of work and calculate total costs.

6E.4 Given a description of an unfamiliar job and an estimating guide for labor and material requirements, prepare estimates of materials and labor requirements and calculate total costs from given units costs and wage/salary rates.

6E.5 Given the cost per hour of a service, calculate the total cost for a given number of hours.

ITEM I- CONVERSION; ENGLISH UNITS

6I.1 Convert units of distance from one English unit to another.

6I.2 Convert units of area from one English unit to another.

6I.3 Convert units of capacity from one English unit to another.

6I.4 Convert units of weight from one English unit to another.

UNIT 7- ALGEBRA

ITEM A- SYMBOLS AND TERMINOLOGY

7A.1 Identify "=" as the equals sign, ">" as "is greater than" and "<" as "is less than".

7A.2 Identify a variable as a number whose value is to be determined and a constant as a number which is given.

7A.3 Identify a coefficient as the numerical part of a variable, an exponent as the power to which a number is raised, and a factor as an exact divisor of a number or term.

INSTRUCTIONAL OBJECTIVES

ITEM B - DIRECTED NUMBERS

7B.1 Define directed numbers as numbers having + or - signs.

7B.2 Given a group of directed numbers, arrange them in ascending or descending order.

7B.3 For a given directed number, supply its opposite.

7B.4 Define absolute value as the numerical value of a number without its sign.

7B.5 For a given number, write its absolute value.

7B.6 Given two or more directed numbers, find the sum.

7B.7 Given two or more directed numbers, find the difference.

7B.8 Given two or more directed numbers, find the product.

7B.9 Given two directed numbers, find the quotient.

7B.10 Given several directed numbers, find their average.

ITEM C - FORMULA SOLUTION

7C.1 Given a formula of the nature of $M = \frac{10A \times B}{C}$ or $M = \frac{(A + B)(B + C)}{D}$ and the numerical values of the unknowns to the right of the equal sign, solve.

7C.2 Given a formula of the nature of $M = \frac{\sqrt{A + 2B}}{C}$ or $M = \frac{A^b \times 3C}{D}$, the numerical values of the unknowns to the right of the equal sign, and a table of equivalents of the powers and roots (or a calculator), solve.

ITEM D - ONE-VARIABLE OPEN SENTENCES

7D.1 Write single variable open sentences given verbal statements of relations.

7D.2 Solve single variable open sentences.

7D.3 Write and solve routine word problems which require equations in one unknown (such as: consecutive integer, angle, uniform motion, mixture, work investment, and average problems.

INSTRUCTIONAL OBJECTIVES

ITEM E - PROGRESSIONS and SERIES

7E.1 Define an arithmetic progression as a sequence $\{a_n\}$ such that each term is determined by the equation $a_n = a_1 + (n - 1)d$, where a_1 is the first term of the sequence, d is the difference between terms, and n represents the number of the term.

7E.2 Given a sequence in which the difference between consecutive numbers is a constant, identify it as an arithmetic progression, find the general formula for a_n, and find the value of a given term.

7E.3 Find the first five terms of an arithmetic progression, given the values of "a_1" and "d."

7E.4 Define Σ as the symbol for summation.

7E.5 Find the sum of the first n terms of a given arithmetic progression.

$$\left[\sum_{r=1}^{n} a_r = S_n = n\left(\frac{a_1 + a_n}{2}\right)\right].$$

7E.6 Given the n^{th} partial sum of an arithmetic progression and the difference between terms, find a_1 and a_n.

7E.7 Define a geometric progression as a sequence, $\{a_n\}$ such that each term is obtained from the formula $a_n = a_1 r^{n-1}$, where a_1 is a given first term and r is a given number.

7E.8 Given a sequence in which the quotient of consecutive terms is a constant, identify it as a geometric progression, find the general formula for a_n, and find the value of a given term.

7E.9 Find the first five terms of a geometric progression given the values of a_1 and r.

7E.10 Determine the n^{th} partial sum of the first n terms of a given geometric progression.

$$\left[S_n = \sum_{k=1}^{n} a_1 r^{k-1} = \frac{a_1(1 - r^n)}{1 - r}\right].$$

7E.11 Determine the arithmetic mean of two numbers, "a" and "b".

$$\left[\frac{(a + b)}{2}\right].$$

INSTRUCTIONAL OBJECTIVES

7E.12 Given two numbers, a_1 and a_2, find three numbers, a_2, a_3 and a_4, such that a_1, a_2, a_3, a_4, and a_5 form the first five terms of an arithmetic progression.

7E.13 Determine the geometric mean of two numbers, "a" and "b".

$$\left[\sqrt{ab}\right].$$

7E.14 Given two numbers, b_1 and b_5, find three numbers, b_2, b_3, and b_4, such that b_1, b_2, b_3, b_4, and b_5 form the first five terms of a geometric progression.

7E.15 Given a sequence, determine the next number which would satisfy the sequence.

7E.16 Given a sequence with a number missing, determine a number such that a general rule can be stated for all members of that sequence (including the missing one).

INSTRUCTIONAL OBJECTIVES

ITEM F - EXPONENTS and POLYNOMIALS

7F.1 Multiply and divide like numbers having different exponents.

7F.2 Find powers and roots of given numbers containing exponents.

7F.2a Define numbers having an exponent of 0 as equal to 1.

7F.2b Define fractional exponents as roots $\left[(4)^{\frac{1}{2}} = 2 \; ; (81)^{\frac{1}{4}} = 3\right]$.

7F.3 Define a polynomial as an algebraic expression containing variables.

7F.4 Given polynomials, add them.

7F.5 Given two polynomials, find their difference.

7F.6 Multiply a polynomial by a monomial.

7F.7 Multiply a polynomial by a polynomial.

7F.8 Divide a polynomial by a monomial.

7F.9 Divide a polynomial by a polynomial.

7F.10 Simplify sums and differences of polynomials.

7F.11 Simplify products and quotients of polynomials.

ITEM G - SPECIAL PRODUCTS & FACTORING

7G.1 Given polynomials containing common factors, factor them.

7G.2 Multiply two polynomials, one of which is the sum and the other is the difference of two terms [i.e.: $(x - 7)(x + 7)$.]

7G.3 Factor a number in the form $x^2 - c^2$.

7G.4 Square a binomial.

7G.5 Factor a trinomial in the form $x^2 + 2cx + c^2$.

7G.6 Factor the products of either binomial sums or binomial differences.

7G.7 Factor the product of a binomial sum and a binomial difference.

7G.8 Factor a polynomial involving more than one type of factoring.

7G.9 Solve polynomial equations by factoring.

INSTRUCTIONAL OBJECTIVES

ITEM H - RADICALS, RATIONAL and IRRATIONAL NUMBERS and QUADRATIC EQUATION

7H.1 Define the root of a number as that number which, when taken as a factor a given number of times, yields the original number.

7H.2 Identify a radical as the symbol $\sqrt{\ }$ indicating a certain root to be taken.

7H.2a Determine the number of roots of an equation. (The student need not solve the equation, merely state the possible number of roots which would satisfy the equation.)

7H.3 Identify a rational number as a number which can be expressed as a fraction and an irrational number as one which cannot be expressed as a fraction.

7H.4 Given two or more terms, each containing a radical, find their product or quotient and simplify it.

7H.5 Given two terms, each consisting of the sum and/or difference of two radicals, find their product and simplify it.

7H.6 Given an equation in one variable, solve it by using the quadratic equation:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

7H.7 Given a trinomial equation, solve it by completing the square.

ITEM I - GRAPHS

7I.1 Given a coordinate system and a point on it, give the coordinate of that point in the form (a, b).

7I.2 Given a coordinate system and the coordinates of a point in the form (a, b), draw the point in its correct position.

7I.3 Given a linear equation in two variables, plot it on a graph.

7I.4 Determine the slope of a line on a graph.

7I.5 Write the equation of a line in the slope intercept form.

7I.6 Determine the equation of a line, given two points on the line.

ITEM J - SENTENCES IN TWO VARIABLES

7J.1 Determine that adding, subtracting, multiplying or dividing both sides of an equation by the same number doesn't alter the equality.

7J.2 Separate the known and unknown quantities in an equation so that the unknowns are isolated on the left side of the equal sign and the knowns are on the right side of the equal sign.

INSTRUCTIONAL OBJECTIVES

7J.3 Solve an equation or a pair of equations in two variables by the graphic method.

7J.4 Solve a pair of equations in two variables by the substitution method.

7J.5 Solve a pair of equations in two variables by adding or subtracting.

7J.6 Solve a pair of equations in two variables by comparison.

7J.7 Solve word problems involving one or more equations with two variables.

ITEM K - MATRICES

7K.1 Define a matrix as a rectangular array of elements usually representing linear simultaneous equations.

7K.2 Perform the sum or difference of two given matrices.

7K.3 Find the product of a given matrix and a given scalar.

ITEM L - PERMUTATIONS and COMBINATIONS

7L.1 Recognize permutations as arrangements or sequences of all or part of a set of things with respect to their order of placement.

7L.2 Recognize combinations as arrangements or sequences of all or part of a set of things without regard to the order of placement.

7L.3 Define "n factorial" as "n!" as $n\,(n-1)(n-2)\ldots(1)$.

7L.4 Solve n! for a given value of n.

7L.5 Determine the number of permutations of a set of objects taken all at a time:

a.) without repetitions = $n!$;
b.) with repetitions = $\frac{n!}{(r_1!)(r_2!)}$ where r_1, r_2 represent the number of repetitions of objects in the set.

7L.6 Determine the number of permutations of a set of "n" things taken "r" at a time without repetitions, given n, r, and the formula $\frac{n!}{(n-r)!}$

7L.7 Determine the number of permutations of a set of "n" objects taken in groups of "r" with repetitions allowed, using the formula n^r.

INSTRUCTIONAL OBJECTIVES

7L.8 Determine the number of combinations of a set of "n" objects taken "r" at a time, without repetitions, using the formula:

$$_nC_r = \frac{n!}{(n-r)!r!}$$

7L.9 Given a set of "n" objects, determine the possible combinations of groups of "r" objects when repetition is allowed by evaluating the formula: $\frac{(n + r - 1)!}{(n - 1)!\, r!}$

ITEM M - PROBABILITIES

7M.1 Given a situation for which there are two or more outcomes, write the probability of event E as:

$$P(E) = \frac{\text{number of outcomes favorable to E}}{\text{total number of possible outcomes.}}$$

7M.2 Given 2 disjoint events such that $E_1 \cup E_2 = S$ (where S is the sample space), solve problems using the identities:

$E_1 + E_2 = P(S) = 1$ and its derivations

$P(E_1) = 1 - P(E_2)$ and $P(E_2) = 1 - P(E_1)$.

7M.3 Define the odds in favor of an event as the quotient:

$$\frac{\text{favorable outcomes}}{\text{nonfavorable outcomes}}$$

and the odds against an event as the quotient:

$$\frac{\text{unfavorable outcomes}}{\text{favorable outcomes.}}$$

7M.4 Solve simple problems involving the calculation of the odds in favor of or against an event.

7M.5 Determine the number of combinations of size "r" which are possible from a set of size "n" ($r \leq n$) using the formula

$$_nC_r = \frac{_nP_r}{r!}.$$

7M.6 Determine the probability of a given event using the equation:

$$P(E) = \frac{_mC_r}{_nC_r},$$ where "m" is the number of elements of the sample set which satisfy the outcome desired, "n" is the total number of members in the sample set, and "r" is the size of the groups to be arranged so as to satisfy the event.

INSTRUCTIONAL OBJECTIVES

7M.7 Define "mutually exclusive" events as two events which cannot both be satisfied simultaneously by a given outcome. (If E_1 and E_1 are disjoint sets, then $P(E_1 \cap E_2) = 0$.)

7M.8 Determine the probability of either one of two mutually exclusive events occurring [$P(E_1 \cup E_2) = P(E_1 \text{ or } E_2) = P(E_1) + P(E_2)$.]

7M.9 Determine the probability of one of two outcomes occurring if the two events are <u>not</u> mutually exclusive.

[$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$.]

7M.10 Determine the probability of two successive independent events, where an independent event A is defined as one which is <u>not</u> affected by the occurrence or nonoccurrence of an event B.

[$P(E_1 \text{ and then } E_2) = P(E_1) \cdot P(E_2)$,]

7M.11 Determine the probability of two successive dependent events, where a dependent event R is defined as one which <u>is</u> dependent on the occurrence or nonoccurrence of an event S.

$$P(E_1 \text{ and then } E_2) = \frac{{}_mC_r \cdot {}_nC_s}{{}_tC_{(r+s)}}$$ where ${}_mC_r$ is the number of ways of satisfying E_1, ${}_nC_s$ is the number of ways to satisfy E_2, and ${}_tC_{(r+s)}$ is the total number of ways that the sample set (t) can be combined into groups of size (r+s).

7M.12 Define the array pictured below as Pascal's Triangle and derive the next two rows:

```
          1
        1   1
      1   2   1
    1   3   3   1
  1   4   6   4   1
```

7M.13 Use Pascal's triangle to determine the probability of a given event.

7M.14 Define the "expected value" or "expectation" of a game as the probability of an event multiplied by the winnings realized for that event. (For a "fair" game, the expectation equals the cost of playing.)

INSTRUCTIONAL OBJECTIVES

ITEM N - NUMBER BASES

7N.1 Define the "base" of a number system as the number whose powers represent the value of each digit of a number (e.g., $114_{10} = 1 \times 10^2 + 1 \times 10^1 + 4 \times 10^0$; $110010_2 = 1 \times 2^5 + 1 \times 2^4 + 0 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0$).

7N.2 Given two or more numbers in a specified base, find the sum.

7N.3 Given two numbers in a specified base, find the difference.

7N.4 Given two numbers in a specified base, find the product.

7N.5 Given two numbers in a specified base, find the quotient.

7N.6 Given a number in base "b", convert that number to base 10.

7N.7 Given a number in base 10, convert that number to base "b".

7N.8 Convert a number in base 10 to a given base "b" using the remainder algorithm.

7N.9 Given a number in base 10, convert it to base 2 notation.

ITEM O - SET THEORY

70.1 Define a set E as a group of objects.

70.2 Define the following symbols and mathematical statements:

a. $x \in A$ (x is a member of set A);
b. $\emptyset$ (the null set);
c. E' (the complement of set B over the universal set);
d. $C \subset D$ (set C is a subset of set D);

70.3 Given two sets, A and B, find set C such that $C = (A \cap B)$.

70.4 Given two sets, D and E, find set F such that $F = (D \cup E)$.

70.5 Given a set G on a universal set R, find G'.

70.6 Given a set H and an element x, determine if $x \in H$.

70.7 Given two sets, J and K, determine if $J \subset K$.

70.8 Given a set L, list all possible subsets of L.

INSTRUCTIONAL OBJECTIVES

70.9 Given a set M in set builder notation (i.e., $\{ x \mid x$ is an odd number greater than zero$\}$), list the first ten terms.

70.10 Define the difference of two sets N and O (N-O) as the set of all elements that belong to N and not O.

70.11 Given three or more sets, find the set resulting from a series of set operations (complements, unions, intersections, and/or differences.

ITEM P - GROUP THEORY

7P.1 Define an operation as a rule by which one or more objects are used to obtain another (not necessarily different) object and a binary operation as a rule by which two objects are used to determine a third (not necessarily different) object.

7P.2 Define a mathematical system as a set of elements together with one or more binary operations that are rules for combining any two elements of the set.

7P.3 Given two numbers and a binary operation defined on them, determine if the operation is commutative (i.e., $a \bullet b = b \bullet a$).

7P.4 Given three numbers and a binary operation defined on them, determine if the operation is associative (i.e., $(a \bullet b) \bullet c = a \bullet (b \bullet c)$).

7P.5 Given a binary operation B and a set S, determine if it has closure (i.e., if $x, y \in S$; $x \, B \, y \in S$).

7P.6 Define an identity element over a system consisting of set S and an operation $\bullet$ as the element e such that $a \bullet e = e \bullet a = a$ for every element "a" in set S.

7P.7 Given a system consisting of a set and a binary operation $\bullet$, determine if an identity element exists and, if so, name it.

7P.8 Define an inverse element as the element "r" such that $r \oplus a = a \oplus r = i$ where "i" is the identity element, $\oplus$ is a binary operation defined on S. (Note that systems without identity elements cannot have inverses).

7P.9 Given a system, determine if each element has an inverse.

7P.10 Given a system consisting of a set Q and two binary operations, $\bullet$ and $\odot$, determine if the system is distributive (i.e., $a \bullet (b \odot c) = (a \bullet b) \odot (a \bullet c)$).

INSTRUCTIONAL OBJECTIVES

7P.11 Given a mathematical system consisting of a set S and an operation • defined on S, determine if it is a group using the following criteria:

a.) The system is closed;
b.) The system is associative;
c.) The system has an identity element;
d.) Every element in the system has an inverse in the system.

7P.12 Given an expression such as: b(mod m) (b and m are integers), evaluate it.

7P.13 Given an equation such as: a = b(mod m) (a,b, and m are integers), determine whether it is true or false.

7P.14 Given an equation similar to: ax = b(mod n), and the values of a, b and n, determine x.

7P.15 Given an equation of the form: y = a(mod m), the values of "a" and "m", and a range of values for "y" (e.g. $100 \leq y \leq 200$), determine all possible values of "y".

7P.16 Given two or more equations in the form: z = c(mod n), the values of "c" and "n", and a range of values for z (e.g., $10 \leq z \leq 50$), determine the values of "z" which satisfy all the conditions.

7P.17 Solve a routine word problem involving modular arithmetic.

INSTRUCTIONAL OBJECTIVES

UNIT 8 - MEASURE

ITEM A - READ GRADUATED SCALES

8A.1 Identify a number obtained by counting as an exact number and a number obtained by measuring as an approximate number.

8A.2 Round off a number (including mixed numbers) to a given unit of precision.

8A.3 Identify a series of consecutive whole numbers or multiples of whole numbers with or without equal subdivisions between numbers on a measuring device, as a graduated scale.

8A.4 Write the size of the interval between:

a. numerals on a graduated scale.
b. subdivisions on a graduated scale.

8A.5 Write the measurement indicated on a sketch of a graduated scale:

a. to the nearest whole number when the scale is marked off in consecutive whole numbers with or without subdivisions.
b. to a given precision when the scale is marked off in multiples of a whole number with or without subdivisions.
c. to a given precision when the scale is marked off in whole numbers with or without subdivisions representing fractions such as halves, quarters, eighths, sixteenths, tenths, or fifths.
d. to a given precision when the scale is marked off in whole numbers which represent multiples of a given number such as 100 or 1000.

8A.6 Write the measurement indicated on a sketch of a combination of scales which may be circular and read in either a clockwise or counterclockwise direction, such as on a gas or electric meter.

8A.7 Write the measurement indicated on a set of interlocking scales such as micrometers and calipers (including vernier instruments).

UNIT 9 - METRIC MEASURE

ITEM A - DISTANCE

9A.1 Identify millimeters, centimeters, decimeters, meters, decameters, hectometers, and kilometers as units of metric distance measure.

INSTRUCTIONAL OBJECTIVES

9A.2 Convert units of distance from one metric unit to another (e.g., one hectometer equals 100 meters).

9A.3 Estimate the length, width, or height of common objects or the distance between objects, to within 20% of the actual distance.

9A.4 Measure a given distance or one dimension object with a ruler or tape measure, correct to within one unit of the scale reading.

ITEM B - DISTANCE CONVERSION

9B.1 Given tables, convert metric distance measurements to English measurements.

9B.2 Given tables, convert English distance measurements to metric measurements.

ITEM C - WEIGHT

9C.1 Identify milligrams, centigrams, decigrams, grams, decagrams, hectograms, kilograms, and metric tons as units of metric weight measure.

9C.2 Convert units of weight from one metric unit to another (e.g., 100 grams equals one hectogram).

9C.3 Estimate the weight of common objects to within 20% of the actual metric weight.

9C.4 Weigh common objects on balance or spring loaded scales, correct to within one unit of the metric scale readings.

ITEM D - WEIGHT CONVERSION

9D.1 Given tables, convert metric weight measurements to English measurements.

9D.2 Given tables, convert English weight measurements to metric measurements.

ITEM E - CAPACITY

9E.1 Identify milliliter, centiliter, deciliter, liter, decaliter, and hectoliter as units of metric capacity.

INSTRUCTIONAL OBJECTIVES

9E.2 Convert units of capacity from one metric unit to another (e.g., 10 liters equals one decaliter).

9E.3 Estimate in metric units the contents or the capacity of common containers, to within 20% of the actual content or or capacity.

9E.4 Measure content or capacity of a container to within one unit of the scale of the measuring instrument.

ITEM F - CAPACITY CONVERSION

9F.1 Given tables, convert metric measures of capacity to English measurements.

9F.2 Given tables, convert English quantities to metric measurements.

ITEM G - TEMPERATURE CONVERSION

9G.1 Identify Centigrade as the metric scale of heat and Fahrenheit as the English measure of heat.

9G.2 Using the formula $T_F = \frac{9}{5} T_C + 32$, convert a given temperature in degrees Centigrade to the Fahrenheit scale.

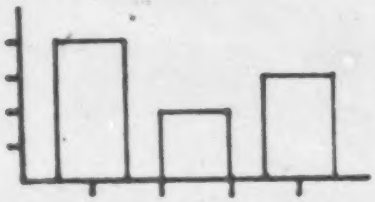
9G.3 Using the formula $T_C = \frac{5}{9} (T_F - 32)$, convert a given temperature in degrees Fahrenheit to degrees Centigrade.

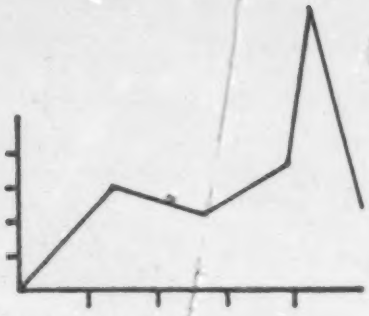
9G.4 Given tables, convert degrees Centigrade to Fahrenheit.

9G.5 Given tables, convert degrees Fahrenheit to Centigrade.

INSTRUCTIONAL OBJECTIVES

UNIT 10 - DRAWINGS and GRAPHS





ITEM A - READ GRAPHS

10A.1 Read specified data from a simple line, bar, or circle graph.

ITEM B - DRAW GRAPHS

10B.1 Given simple data construct line and bar graphs to display a visual representation of the data.

INSTRUCTIONAL OBJECTIVES

UNIT 11 - GEOMETRIC FIGURES

ITEM A - FORMS and FIGURES

11A.1 Identify rectangles, squares, triangles, circles, rectangular solids, cubes, pyramids, cones, cylinders, and spheres from a set of objects, pictures of objects, or names of objects.

11A.2 Identify:

a. rectangles, squares, triangles, and circles as plane figures (two-dimensional).
b. rectangular solids, cubes, pyramids, cones, cylinders, and spheres as solid figures (three-dimensional).

11A.3 Identify rectangles, squares, triangles, circles, rectangular solids, cubes, and cylinders given their definitions or characteristics.

11A.4 Calculate the diagonal of a rectangle or square.

11A.5 Given a group of triangles, identify scalene, isoceles, right, and equilateral triangles.

11A.6 Given a right triangle, identify the hypotenuse and the legs.

11A.7 Given 2 legs of a right triangle, calculate the hypotenuse using the Pythagorean Theorem.

11A.8 Given the hypotenuse and one leg of a right triangle, calculate the other leg using the Pythagorean Theorem.

11A.9 Identify the radius, diameter, circumference, and chord of a given circle.

ITEM B - ANGLES

11B.1 Identify 30°, 45°, 60°, and 90° angles from a set of such angles, without the aid of a protractor.

11B.2 Given a set of angles, identify acute, obtuse, right, straight, and reflex angles.

11B.3 Identify supplementary angles as angles whose sum is 180°, and complementary angles as angles whose sum is 90°.

11B.4 Determine that a quadrilateral or circle has 360°, and a triangle has 180°.

11B.5 Given two of the angles in a triangle, determine the third.

INSTRUCTIONAL OBJECTIVES

11B.6 Given the exterior angle and one of the non-adjacent angles of a triangle, determine the number of degrees in the remaining two angles.

11B.7 Define parallelograms by the properties of their angles and the lengths of their sides.

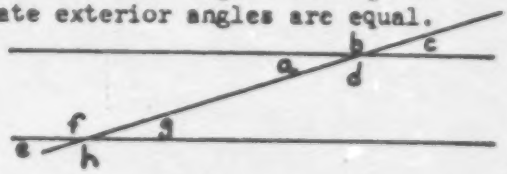
11B.8 Define parallel lines as lines which are equidistant from each other and which do not intersect no matter how far they are produced.

11B.9 Define a transversal as a line which cuts through two or more parallel lines.

11B.10 Identify vertical angles and their properties.

11B.11 Given two parallel lines and a transversal cutting them both, determine that:

a. interior angles lie between the two parallel lines.
b. exterior angles lie outside the two parallel lines.
c. alternate interior angles are equal.
d. alternate exterior angles are equal.



$\angle c = \angle g = \angle a = \angle e$
$\angle f = \angle d = \angle b = \angle h$

11B.12 Identify the properties of similar tranglcs and determine the lengths of the sides using the proportion method.

11B.13 Identify rectangles, rhombuses and squares as special cases of parallelograms and define each form by angle measures and the length of the sides.

11B.14 Identify regular and irregular polygons.

ITEM C - DRAW/SKETCH

11C.1 Draw angles correct to within 1°.

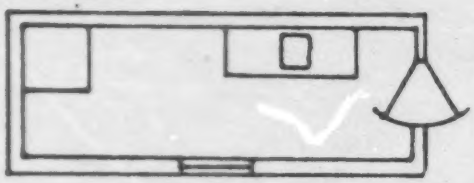
11C.2 Sketch angles correct to within 15°.

11C.3 Draw or sketch (not to scale) (student choice) squares, rectangles, triangles, circles, cubes, rectangular solids, cylinders, cones, and pyramids.

11C.4 Represent, by drawing or sketching (student choice), common objects using oblique projections.

INSTRUCTIONAL OBJECTIVES

UNIT 12 - DRAWINGS and GRAPHS



ITEM A - READ SCALE DRAWINGS

12A.1 Identify 1:4, 6:1, 1" to the foot, 1" = 5 mi., 1:50,000, etc. as examples of scales used to represent reductions or expansions of the actual size of an object.

12A.2 Convert a scale measurement to true size given the scale.

12A.3 Identify a given drawing as a map, blue print, photograph, schematic diagram or assembly (exploded view) drawing.

12A.4 Identify various features on scale drawings such as symbols, rooms, detail drawings.

ITEM B - DRAW TO SCALE

12B.1 Draw a line to a given scale.

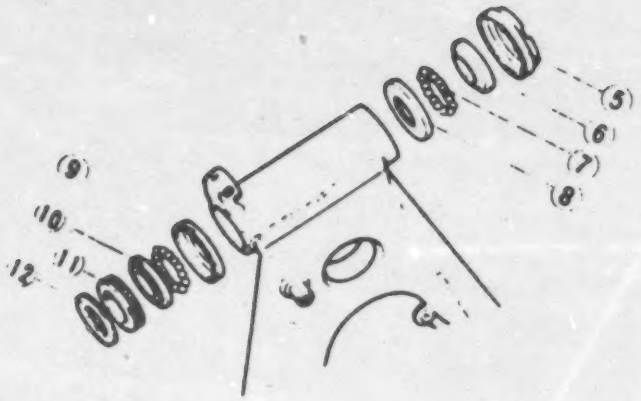
12B.2 Draw a plane figure to represent a given flat object to a given scale.

12B.3 Given a compass, right angle triangle, and a ruler, draw to scale front, top, and side representations of common objects which are rectangular solids, cylinders, cones, or pyramids.

NB: Emphasis should not be placed on drafting skills (line weight, corner construction, etc.) or on artistic skills (shading, balance, etc.) but on accuracy of measurements. In other words, can the student construct sketches or drawings which can be accurately read?

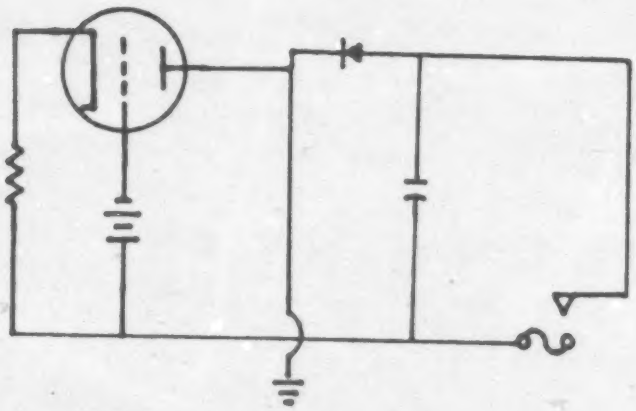
ITEM C - MEASURE FROM SCALE DRAWINGS

12C.1 Calculate actual dimensions of an object given a ruler and a simple scale drawing of the object.



ITEM D - READ ASSEMBLY DRAWINGS

12D.1 Identify the order in which parts are put together in an assembly drawing.



ITEM E - READ SCHEMATIC DRAWINGS

12E.1 Trace a particular sub-system on a simple schematic drawing.

12E.2 Identify the symbols used on schematic drawings.

ITEM F - SHOP DRAWINGS

12F.1 Identify the dimensions on a shop drawing.

12F.2 Identify symbols and abbreviations commonly used on shop drawings.

INSTRUCTIONAL OBJECTIVES

UNIT 13 - READING I

ITEM A - LETTERS OF THE ALPHABET

13A.1 Given letters of the alpnabet in manuscript form and in random order, read each letter and pronounce each letter correctly.

13A.2 Given the letters of the alphabet in manuscript form and in random order, read each letter correctly in the proper alphabetical order.

UNIT 14 - BASIC WORD CUES

ITEM A - BEGINNING READING

14A.1 (Auditory Discrimination)

a. Given a list of word pairs orally, student will indicate which word pairs rhyme and which don't.
b. Given a list of word pairs orally, student will indicate which word pairs begin with the same sound and which pairs don't.
c. Given a list of word pairs orally, student will indicate which word pairs have the same vowel sound and which pairs don't.
d. Given a list of word pairs orally, student will indicate which word pairs have the same ending sounds and which pairs don't.

14A.2 Beginning Consonants: Given a familiar word and a list of consonants the student will make new words by substituting each of the consonants for the initial one in the original word. The student will pronounce each newly formed word correctly.

14A.3 Beginning Consonant Blends: Given orally a list of words which begin with consonant blends, student will correctly identify the letters making the initial blend sound. Initial blends will include:

dr, fr, bl, cl, fl
sc, sm, sp, cr, tr, br
st, gr, pl, sn, sl, sw
gl, sk, pr, str, spr, tw, squ
scr, shr, thr, spl

14A.4 Final Consonants: Given orally a word ending in a consonant and a written list of letters, the student will identify that final consonant on the list.

INSTRUCTIONAL OBJECTIVES

14A.5 Final Consonant Blends: Given orally a list of words which end with consonant blends, student will correctly identify the letters making the final blend sound. Final consonant blends will include:

ft sk st sp ld rd rk rt

nk nd ng nt lm mp

14A.6 Short Vowel Sounds: Given one-syllable words having short vowels in initial or medial position, student will blend the sound patterns together to produce the correct sound.

14A.7 Long Vowel Sounds: Given a list of one syllable words with a short vowel, student will make new words with a long vowel sound by adding a final E and will pronounce the new word correctly.

14A.8 Vowel Diphthongs: Given a list of words having the vowel digraphs au, aw, ew, eu, oo, and ou, the student will pronounce each word correctly.

14A.9 Vowels with "r": Given a list of words containing a single vowel followed by the letter r, student will pronounce each word correctly.

14A.10 Sight Words: Given the Barnes Revised Dolch List of 193 words, student will read all words correctly.

ITEM B - PRE-A.O.K.

14B.1 Given a one-syllable word in which there is a single vowel at the beginning or in the middle, student will pronounce the vowel with a short sound.

14B.2 Given a one-syllable word that has a single vowel at the end, the student will pronounce the vowel with a long sound.

14B.3 Given a one-syllable word with this pattern: CVCE, the student will pronounce the vowel with a long sound.

14B.4 Given the letter combinations: ai, oa, and ea in one-syllable words, the student will pronounce the combination according to the more common pattern of making the first vowel long and the second silent.

14B.5 Given one-syllable words, in which the letter combinations er, ir, and ur appear, the student will pronounce the combinations as (ur).

14B.6 Given a one-syllable word in which a is followed by r, the student will pronounce the sound neither long, nor short, but as in the word "car".

14B.7 Given a one-syllable word in which a vowel is followed by two consonants and a final e, the student will pronounce the vowel with a short sound.

14B.8 Given the letters ti, ci, or si in a word, the student will pronounce the combination as "sh".

14B.9 Given a word in which c or g are followed by e, i, or, y, the student will pronounce those letters with a soft sound.

14B.10 Given a list of words, the student will identify those that have a schwa sound in an unstressed syllable.

14B.11 Given a list of words containing the four sounds of "y", the student will pronounce the words correctly.

14B.12 Given a list of words containing the different sounds of "gh" and "ght" the student will pronounce the words correctly.

ITEM C - A.O.K. (BASIC SYLLABICATION)

14C.1 Given a multi-syllable word in which two consonants follow the first vowel, the student will divide that word between the two consonants. (Students will recognize that consonant blends and digraphs are treated as a single consonant.)

14C.2 Given a multi-syllable word in which a single consonant follows the first vowel sound, the student will divide that word in two possible places V/CV VC/V and give three possible pronuuciations. (Vowel as long, short, or schwa)

14C.3 Given a word in which the letters -le follow a consonant, the student will divide the word making the CLE letters a single syllable.

14C.4 Given a word in which there are prefixes or suffixes, the student will syllabicate that word showing that prefixes and suffixes form their own syllables.

ITEM D - ADVANCED (DEVELOPMENTAL) READING

14D.1 Prefixes, suffixes, roots: To state the meanings of common Latin and Anglo-Saxon prefixes, suffixes, and roots.

14D.2 Variant spellings: To be able to list different ways to spell the following vowel sounds: ă, ĕ, ĭ, ŏ, o͝o, ŭ, o͡o (as in all), ou, oi, o͝o, ĕ, ŭ, ĭ.

14D.3 Accents: To list the 4 basic clues for finding the accented syllable:

Clue I: The accent falls on a root, generally, when one or more prefixes or suffixes are added.

Clue II: The accent generally falls on the syllable that precedes these suffixes: sion, tion, ic.

Clue III: For words of 3 or more syllables, one syllable generally stands between the accented syllable and the silent "e" syllable.

Clue IV: The accent generally falls on the syllable that precedes the vowel "i" when this letter occurs before a final syllable.

14D.4 Contractions and Abbreviations

a. Contractions: To be able to write the long form for common contractions and write contractions for common long forms.

b. Abbreviations: To be able to write given words in abbreviated form and write the long form of given abbreviations.

14D.5 Synonyms, Antonyms, Homonyms

a. Synonyms: To be able to select synonyms for given words.

b. Homonyms: To be able to select and use proper homonyms according to sentence context.

c. Antonyms: To be able to select antonyms for given words.

UNIT 15 - BASIC SIGHT WORDS

ITEM A - GENERAL

15A.1 Read a list of 50 words from a series of commonly used terms (e.g., from the Dolch List).

15A.2 Read words from the labels of frequently-used products or of products used in a given occupation.

INSTRUCTIONAL OBJECTIVES

15A.3 Read and use in an oral sentence words from a list of words common to the vocabulary of a given occupation.

ITEM B - FUNCTIONAL SIGNS

15B.1 Read aloud and explain a series of common functional signs (e.g., safety signs, road signs, etc.).

ITEM C - MEANING FROM CONTEXT

15C.1 Use context to replace nonsense words in given sentences.

15C.2 Select the meaning of words as used in the context of sentences and paragraphs.

15C.3 Use clues in a given sentence to select the correct word to fit in the context of a sentence.

15C.4 Select the meaning from context of familiar words used in ways in which meaning varies.

UNIT 16 - READ II

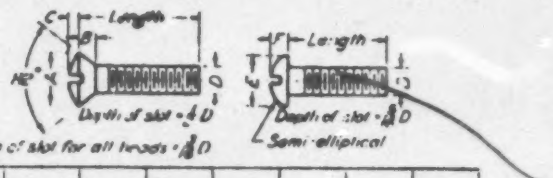
ITEM A - Form

16A.1 Identify a form as a standardized printed document with blank spaces for recording certain needed information.

16A.2 Interpret terminology and abbreviations frequently found in forms.

16A.3 Identify various kinds of forms by stating the kind of information to be recorded.

16A.4 Given a variety of common business forms such as work orders, job orders, issue and receipt vouchers, claims and purchase orders, answer factual questions based on the data on the forms.



Nominal size	Diameter D	Threads per in. (coarse)	Threads per in. (fine)	A	B	C	H	V	G
2	0.086	56	64	0.104	0.046	0.041	0.154	0.055	0.132
3	0.099	48	56	0.120	0.054	0.048	0.178	0.073	0.153
4	0.112	40	48	0.216	0.061	0.054	0.202	0.081	0.174
5	0.125	40		0.262	0.069	0.061	0.227	0.090	0.196
6	0.138	32	40	0.268	0.076	0.067	0.250	0.097	0.217
8	0.164	32	36	0.320	0.092	0.080	0.298	0.113	0.260
10	0.190	24	32	0.372	0.107	0.094	0.346	0.130	0.303
12	0.216	24	28	0.424	0.122	0.107	0.395	0.146	0.344
1/4	0.250	20	28	0.492	0.142	0.125	0.458	0.168	0.402

INSTRUCTIONAL OBJECTIVES

ITEM B - CHARTS AND TABLES

16B.1 Describe the uses of charts and tables and define them as a visual way to give information in a compact and organized form.

16B.2 State the type of information recorded on given charts or tables.

16B.3 Given common reference tables and charts such as organization charts, parts charts, reference tables, including charts and tables designed in matrix form (rows and columns), answer factual questions based on the data supplied.

ITEM C - NOTES, LETTERS, AND MEMOS

16C.1 Given notes, letters, or memos, be able to identify:

a. the author;
b. the recipient;
c. the activities required of the recipient;

and answer factual and interpretative questions from the contents.

ITEM D - MANUALS, REFERENCE BOOKS

16D.1 Identify a manual as a handbook of instructions and/or information related to one topic, and give an example of a manual.

16D.2 Identify the particular kind of information or directions included in a given manual, using the title, table of contents, and/or index as guide.

16D.3 Identify the parts of a given manual which apply to a given situation using the table of contents and/or index as guide.

16D.4 Given a typical parts manual, be able to locate a particular part and answer factual questions about its description (e.g., price, code number, vendor, etc.).

16D.5 Apply instructions or information from a given manual to a particular situation given an oral description of a problem that can be solved using information from the manual.

16D.6 Given a typical company manual or union agreement containing administrative, policy, personnel, and financial rules and regulations, be able to answer factual questions based on the manual for items such as hours of work, rates of pay, vacation or other leave, grievances, promotion, and discipline.

INSTRUCTIONAL OBJECTIVES

ITEM E - THE NEWSPAPER

16E.1 Given a local newspaper, locate and identify orally the various sections using the table of contents, page numbers, and section headings.

16E.2 Given the classified want ads from a local newspaper, locate and answer orally factual questions on such things as rentals, new and used cars, and employment opportunities, demonstrating a knowledge of the abbreviations and terms used in such ads.

16E.3 Given the entertainment or television section from a local newspaper, locate and answer orally factual who, what, where, and when questions demonstrating a knowledge of the terms and abbreviations used in such ads.

ITEM F - THE DICTIONARY

16F.1 List the common uses of a dictionary.

16F.2 Write a given group of words in alphabetical order including cases where alphabetizing to the fifth letter is required.

16F.3 Select entry words from given examples which can be found between the two given guide words from a dictionary.

16F.4 Read the definition of a word and write a sentence that demonstrates the meaning.

16F.5 Read and list the forms of given words from a dictionary (e.g., write: wrote, written, writing).

16F.6 Use the diacritical marks provided in an entry to pronounce given words.

16F.7 Orally explain abbreviations used in the dictionary (e.g., n.; v.t.; chem.; pl.; Gr; OE).

ITEM G - MAPS

16G.1 Identify a map as a symbolic representation of geographical features.

16G.2 Given a map, identify the region represented.

16G.3 Given a location on a map, use the grid system to read out the map section identifying it (e.g., A-7).

16G.4 Identify common symbols used on maps.

16G.5 Using the index, locate cities or points of interest on the map.

16G.6 Find the mileage between two points on the map using mileage charts.

16G.7 Find the mileage between two points using the numbers printed above the roads on the map.

16G.8 Given a starting point, find at least 2 routes to travel to a destination.

16G.9 Given the speed limits of a region, estimate to within 25% the time needed to travel from one point to another.

ITEM H - CONTRACTS

16H.1 Identify a contract as a legal promise between two or more persons or companies.

16H.2 Interpret terminology commonly used on contracts.

16H.3 Given a contract, answer factual questions based on the information supplied therein.

UNIT 17 - READ

ITEM A - LITERAL COMPREHENSION

17A.1 Select appropriate titles for paragraphs, given a list of titles.

17A.2 Match a given list of main ideas to appropriate paragraphs.

17A.3 Identify orally the main idea in a given paragraph.

17A.4 Identify statements as being true or false after reading a given selection.

17A.5 Answer "what," "who," "when," and "where" questions using factual information from an article.

17A.6 List the facts in a selection that support a given statement.

17A.7 Do an exercise that requires recall of given instructions or information.

17A.8 Identify the event which occurred first, given a pair of events from a selection.

17A.9 Rewrite or re-number a set of events from a given selection in the order they occur in the selection.

17A.10 Arrange a series of given events into proper time sequence.

17A.11 Write a possible next event given a series of events.

17A.12 List the events in outline form, showing proper sequence from a selection of three or four paragraphs.

17A.13 Given a set of written instructions involving activities to be performed by a number of people, and the particular roles, prepare a list and sequence of activities to be performed.

UNIT 18 - READ

ITEM A - EVALUATIVE COMPREHENSION

18A.1 Define "fact" as a statement that can be shown to be true.

18A.2 Define "opinion" as what a person thinks about any subject.

18A.3 Identify given statements as being fact or opinion.

18A.4 Classify sentences in a given article as fact or opinion.

18A.5 Classify advertisements as based on fact or opinion and support the choice.

18A.6 Identify the author's purpose in a given selection as being to entertain, inform, or persuade.

18A.7 Identify supporting statements in a selection for a given author's purpose.

18A.8 Identify methods used by authors to persuade and appeal to emotions by making opinions appear as facts, such as:

a. transfer: to relate the product for sale to something trusted, loved, or attractive for other reasons (e.g., God, the flag, your country, Mother, a beautiful blonde).
b. card-stacking: to make misleading statements which hide the facts or exaggerate the good qualities of a product. E.g.,
   i. "four out of five doctors say that..." Perhaps only five doctors were asked; the next five might say something different.
   ii. "This product is the best...the cheapest...so easy that a child can run it...none better."

c. testimonial: to use the name or testimony of a famous person to endorse the product (e.g., "Joan Goldenhair says that she uses Silky Shampoo every day to keep her hair shining.").

d. bandwagon: to give the idea that everybody, or at least the significant people, are using the product (e.g.,"Everybody loves Scrappy cornflakes; join the gang and try some tomorrow.").

18A.9 Select your opinion from two alternative opinions after reading a selection which attempts to persuade you to a point of view.

18A.10 Write your opinion on a given issue and support it after reading a given selection on that issue.

18A.11 Select your opinion from two contrasting points of view and support your choice.

18A.12 Given a set of general written instructions which necessitate the making of evaluative judgments by the recipients, prepare a list of activities which could be performed, and state the reasons for the choice of activities.

ITEM B - INTERPRETIVE COMPREHENSION

18B.1 Answer "what happened," "how", and "why" questions about a given selection.

18B.2 Answer questions which require a generalized interpretation of facts.

18B.3 Identify the causes or effects of given facts from a selection.

18B.4 List details or statements from a selection which support a given conclusion.

18B.5 State and support a conclusion which can be inferred from a set of facts or from a given article.

18B.6 Answer questions that require a generalized interpretation which can be inferred from given facts and which is not specifically stated in a selection.

18B.7 Write and support a prediction based on the information given in a selection.

18B.8 Given a set of general written instructions, involving activities to be performed by a number of people, and particular roles, prepare a list and sequence of activities to be performed.

INSTRUCTIONAL OBJECTIVES

UNIT 19 - LISTEN

ITEM A - LITERAL COMPREHENSION

19A.1 Identify the correct meanings of words that sound similar but are different in meaning.

19A.2 Provide words which fit the context of given sentences.

19A.3 State the meanings of selected words heard in context.

19A.4 Identify the main idea from a given speech which has just one main idea.

19A.5 State the most important question which a speaker wants answered.

19A.6 Identify the main outcome expected from spoken directions.

19A.7 State the main idea from a spoken statement of several sentences.

19A.8 Identify several important ideas contained in a speech.

19A.9 Identify statements based on given speech as being true or false.

19A.10 Answer "who," "what," "where," "when", and literal "why" questions based on spoken information.

19A.11 List facts from an oral statement which support the main idea.

19A.12 List directions that were given by a speaker.

19A.13 List questions which a speaker asked.

19A.14 Identify the correct order in which a number of events occurred, basing the order on a spoken description of the events.

19A.15 Perform a series of two or three activities which require recall of oral instructions. (The activities to be within the abilities of the student - recall is the item to be demonstrated.)

ITEM B - INTERPRETIVE COMPREHENSION

19B.1 Interpret "what happened," "how," and "why" questions from an oral selection.

19B.2 Identify causes or effects of given situations from an oral selection.

INSTRUCTIONAL OBJECTIVES

19B.3 Answer questions which require a generalized interpretation of facts in an oral selection.

19B.4 State a number of possible results of a situation described orally.

19B.5 Identify what additional information you would like to know after hearing a conversation.

19B.6 State an inference which is implied in given statements.

19B.7 Choose and support a conclusion which can be reached by using facts from an oral selection.

19B.8 State and support a prediction based on information given in a selection.

19B.9 Perform a series of two or three activities which require recall of oral instructions and an interpretation of how the instructions were to be fulfilled. (The activities to be within the abilities of the student - recall and interpretation are the items to be demonstrated.)

ITEM C - EVALUATIVE COMPREHENSION

19C.1 Identify courteous and discourteous words contained in a conversation.

19C.2 Identify words and phrases used by a speaker that suggest his strong feelings about his topic.

19C.3 State what action you should take on the basis of a speaker's message, tone of voice, and manner.

19C.4 State how a speaker's tone and manner indicate his feelings about:

a. his topic,
b. you,
c. another person.

19C.5 State the purpose of a speaker's message.

19C.6 Classify statements as being "fact" or "opinion."

19C.7 Identify opinions in a selection which contains both facts and opinions.

19C.8 Identify facts which were used by a speaker to support his opinions.

19C.9 Evaluate a speaker's opinions.

19C.10 Evaluate a speaker's attitude using given criteria.

19C.11 Evaluate a speaker using given criteria.

19C.12 Evaluate a speaker's content using given criteria.

19C.13 Perform a series of two or three activities which require recall of oral instructions and an interpretation and evaluation of how the instructions were to be fulfilled (the activities to be within the abilities of the student - recall, interpretation, and evaluation are the items to be demonstrated).

UNIT 20 - BASIC WRITING SKILLS

ITEM A - LETTERS OF THE ALPHABET

20A.1 Given the letters of the alphabet in manuscript form and random order, write or print the letters in correct order.

ITEM B - COPYING TEXT AND DRAFTS

20B.1 Given words, write or print them correctly.

20B.2 Given sentences, copy them exactly.

20B.3 Given paragraphs, copy them exactly.

20B.4 Given sentences or paragraphs organized in a rigid form (e.g., a business letter, report, etc.), copy exactly.

20B.5 Identify common proofreading marks and briefly explain their meanings.

20B.6 Given a short passage with proofreading marks inserted, correctly copy the passage incorporating the required changes into the text.

UNIT 21 - NAMES, ADDRESSES, DATES, AND TIME

ITEM A - GENERAL

21A.1 Identify seconds, hours, days, months, years, decades, and centuries as units of time.

INSTRUCTIONAL OBJECTIVES

21A.2 Given dates of the year, locate dates on a current calendar.

21A.3 Given a date (day, month, date, year) write the date using correct punctuation and capitalization.

21A.4 Given a standard clock, tell correct time to within 5 minutes of actual time.

21A.5 Given times of the day, be able to write time:

a. 8:00
b. eight o'clock
c. 8 o'clock

21A.6 Explain and use correctly the abbreviations A.M. and P.M.

21A.7 Explain and use correctly such expressions as: quarter to; half past; quarter of; quarter past.

21A.8 Given a list of names and addresses, write items using proper capitalization and punctuation.

UNIT 22 - FORMS AND JOB APPLICATIONS

ITEM A - PHRASES ON FORMS

22A.1 Given simple data in the form of words and figures, write phrases on forms which are legible and which convey the desired information.

ITEM B - SENTENCES ON FORMS

22B.1 Given simple data in the form of words and figures, write complete sentences on forms which are legible and which convey the required information.

22B.2 Complete a sample application form for employment in a legible manner.

22B.3 Complete a sample application for credit, loan application, or check courtesy card in a legible manner.

22B.4 Write a check and complete bank deposit and withdrawal slips in proper form.

22B.5 Complete a sample form used for registration at hotels or motels.

INSTRUCTIONAL OBJECTIVES

22B.6 Complete other forms used locally to make applications for driver's license, automobile registration, electric service, telephone service, etc.

22B.7 Complete state and federal government forms which are in current use for income tax, medical and hospital services, census, Social Security, etc.

22B.8 Complete entrance forms for public and/or private schools and colleges in a neat and readable manner.

ITEM C - GRAMMAR

22C.1 Identify sentence fragments, run-on sentences, and complete sentences.

22C.2 Rewrite sentence fragments and run-on sentences to make complete sentences.

22C.3 Identify simple, complex, and compound sentences.

22C.4 Given two simple sentences, rewrite them to form compound sentences.

22C.5 Given two simple sentences, rewrite them to form a complex sentence.

22C.6 Identify simple subject and simple predicate of a sentence.

22C.7 Identify complete subject and complete predicate of a sentence.

22C.8 Given the subject, supply the predicate.

22C.9 Given the predicate, supply the subject.

22C.10 Identify the direct object of a verb.

22C.11 Identify the indirect object of a verb.

22C.12 Identify predicate nominative and predicate adjective in a sentence.

22C.13 Identify prepositions and their objects.

22C.14 Define a noun as a person, place, or thing.

22C.15 Given a noun, write sentences using it as: subject, direct object, indirect object, predicate nominative, and object of a preposition.

INSTRUCTIONAL OBJECTIVES

22C.16 Form plurals of common nouns.

22C.17 Form possessives of common nouns.

22C.18 Define a pronoun as a word that takes the place of a noun.

22C.19 Given a pronoun, write sentences using it as: subject, direct object, indirect object, predicate nominative, and object of a preposition.

22C.20 Correctly replace possessive nouns with pronouns.

22C.21 Define an active verb as one that shows action and may take a direct or indirect object.

22C.22 Define a passive verb as one that may take a predicate nominative or predicate adjective, but not a direct or indirect object.

22C.23 Given a subject, write a sentence using an active verb.

22C.24 Given a subject, write a sentence using a passive verb.

22C.25 Select and use correct expressions in commonly misused subject-verb and pronoun agreements involving the following types:

a. singular and plural nouns;
b. subjects joined by "and";
c. singular and plural pronouns;
d. verb "to be" (is, are, was, were);
e. subjects separated from the verb by a phrase or clause.

22C.26 Given the infinitive form of a verb and a group of sentences, supply the correct tense of the verb.

22C.27 Define an adjective as a word that modifies a noun or pronoun.

22C.28 Given a group of sentences, supply the correct form of the adjective.

22C.29 Define an adverb as a word that modifies a verb, adjective, or adverb.

22C.30 Rewrite given simple sentences by adding words, phrases, and clauses to modify the subject, verb, and object.

22C.31 Identify a sentence as declarative, interrogative, exclamatory or imperative.

INSTRUCTIONAL OBJECTIVES

22C.32 Given sentence content, rewrite as a question, command, exclamation, or simple statement using correct end punctuation and capitalization.

22C.33 Given a sentence containing a series or list, punctuate correctly with commas.

22C.34 Given a sentence containing independent clauses and/or dependent clauses, punctuate correctly.

22C.35 Given a sentence containing one or more of the following: appositives, direct address, parenthetical remarks, limiting remarks, etc., punctuate correctly.

22C.36 Identify and correctly use in sentences semicolons, colons, and hyphens.

22C.37 Given sentences containing direct quotations, punctuate correctly.

22C.38 Identify and correctly use apostrophes in contractions, possessives, etc.

22C.39 Correct capitalization in a given sentence which requires addition and/or deletion of capitals.

22C.40 Select and use the correct word in given examples of the use of lie, lay; principal, principle; and other pairs often confused.

22C.41 Correctly rewrite sentences containing a double negative.

22C.42 Given unpunctuated sentences, correctly punctuate, using capitalization, commas, quotation marks, etc.

ITEM D - SHORT NOTES

22D.1 Write short notes to self or to others which convey information about appointments, telephone calls received, visitors, etc., which supply necessary data about who, when, where, what, why, and how.

ITEM E - TAKE NOTES

22E.1 Write down the exact words of a short message given orally.

22E.2 Write the main ideas of a speaker.

INSTRUCTIONAL OBJECTIVES

22E.3 Write notes on details or facts given by a speaker.

22E.4 Record oral information given by filling out an order form or other standard information sheet.

ITEM F - PARAGRAPHS

22F.1 Identify a paragraph as a group of sentences about a single topic or thought.

22F.2 Identify topic sentences in paragraphs.

22F.3 Write a paragraph of four or five sentences given a topic sentence and a set of related facts.

22F.4 Write a paragraph of four or five sentences given a set of related facts.

22F.5 Rewrite a paragraph which contains run-on sentences.

22F.6 Write a paragraph given a series of simple sentences so that events are sequenced and some simple sentences are combined to make compound or complex sentences to vary the sentence structure.

22F.7 Write an outline of an article or a report, to contain four or five paragraphs, which includes the title and the topic sentence of each paragraph.

22F.8 Write a short article or report of four or five paragraphs using proper sentence structure, word usage, punctuation, and paragraph form on a topic of interest.

ITEM G - INTERNAL MEMOS

22G.1 Set up the parts of a business memo in proper form, including sender's name and/or appointment, date, addressee's name and/or appointment, subject heading, body, and signature.

22G.2 Compose business memos in proper form using good sentence and paragraph structure and proper punctuation, from information supplied.

INSTRUCTIONAL OBJECTIVES

ITEM H - PURCHASE ORDERS ETC.

22H.1 Given a typical business form, purchase order, job order, sales slip, and necessary data in words and figures, correctly complete or fill out the appropriate portions of the form.

UNIT 23 - LETTERS

ITEM A - FORM LETTERS

23A.1 Given data and sample form letters, insert the required information on the form letter, such as name, address, date, and fill in blanks.

ITEM B - BUSINESS LETTERS

23B.1 Set up the parts of a business letter in proper form, (sender's address, data, addressee's address, salutation, body, complimentary close, and signature).

23B.2 Given the information for a letter, organize the body of the letter into a logical sequence, such as the following:

a. an introduction which describes the purpose or aim of the letter (why it is being written).
b. a background or history so the reader can understand the discussion which follows.
c. the discussion necessary for the reader to know the current facts on the arguments presented.
d. a closure which includes the recommendation, decision, action requested, or summary.

23B.3 Write the long form of abbreviations commonly used in business letters (e.g., cc, encl., etc.) or common business abbreviations (e.g., Inc., Ltd., F.O.B., etc.).

23B.4 Compose business letters in proper form, using good sentence and paragraph structure, logical sequences, and proper punctuation and spelling, from information supplied.

23B.5 Address an envelope showing sender's name and address, addressee's name and address, and postal codes, in correct format, and punctuate it correctly.

UNIT 24 - WRITING STYLE

Objectives for this unit have not yet been established.

INSTRUCTIONAL OBJECTIVES

UNIT 25 - SPEAKING ABILITY

ITEM A - INFORMATION OR DIRECTIONS

25A.1 Repeat information which has been heard.

25A.2 Describe orally, in a few short sentences, information about a given person, place, thing, or job performed.

25A.3 Answer questions orally about material read (such as a note, memo, or letter).

25A.4 Describe an experience or some event that was witnessed (or read about).

25A.5 Organize and express directions in a logical sequence.

25A.6 Explain to someone else how to perform a fairly complex task, given experience at performing the task, or having learned from another person or a manual how to perform the task.

NB: These objectives are intended to develop skills of imparting information and instructions. The exercises and tests should be carefully designed to ensure that the ability to effectively express information or directions (rather than memory) is being tested.

ITEM B - ELEMENTARY CONVERSATION

25B.1 Demonstrate an effective and appropriate speaking voice and style.

25B.2 State and support own points by citing knowledge, experience, or observation related to the discussion.

25B.3 Insure that the other person has the opportunity to state and support his points of view.

ITEM C - USE TELEPHONE

25C.1 Write the telephone number of a given person or organization using the alphabetical listing section of a telephone directory as reference.

25C.2 Identify local call, person-to-person long distance call, station-to-station long distance call, collect call, and direct distance dial call given a description of each.

25C.3 List the steps in using the telephone to:

a. get the time of day;
b. get a number of a person or organization for a local or long distance call;
c. make a person-to-person long distance call;
d. make a station-to-station long distance call through the operator;
e. make a collect call;
f. make a direct distance dial call to a point with the same and different area codes;
g. report that a telephone is not operating properly;
h. report an incorrectly dialed direct distance dial call.

25C.4 List the names and telephone numbers of businesses dealing in a given article or service using the Yellow Pages as reference.

25C.5 Write the address of a given person or organization using the telephone directory as reference.

25C.6 Practice, using inter-office or simulated phones, making and receiving a variety of local and long-distance telephone calls.

ITEM D - GIVE DIRECTIONS

25D.1 Preface a job conversation with a statement of purpose.

25D.2 Present directions in a sequenced, organized, and concise manner orally to another.

25D.3 Ensure other has the opportunity to clarify his understanding of the directions presented.

25D.4 Summarize the directions presented to reinforce other's understanding.

25D.5 Check other's understanding of directions by questioning.

UNIT 26 - ORGANIZE INFORMATION

ITEM A - SORT DATA

26A.1 Sort data by given classification criteria. (E.g., alphabetical order.)

NB: The data can be in the forms of lists, numbers, words, or on forms such as issue and receipt vouchers.

INSTRUCTIONAL OBJECTIVES

ITEM B - SORT OBJECTS

26B.1 Given objects, sort by given classification criteria. The sorting should require a minimum of judgment. To over-simplify, sorting apples by types or tools by various generic classifications would be appropriate, but sorting apples by quality or lumber by grades is a rating skill.

ITEM C - RANK

26C.1 Arrange, order, tabulate, or sequence information in a required ranking system.

ITEM D - DEVELOP CLASSIFICATIONS

26D.1 Set up a classification system for sorting of given data or objects.

PB: The data/objects should be presented in a way to show an apparent need to sort for a specific reason as filing, warehousing, or summarizing. The student must be told "why" so he can demonstrate mastery of "how."

UNIT 27 - TOOLS, EQUIPMENT AND MATERIALS

ITEM A - USE OF TOOLS AND INSTRUMENTS

27A.1 Using tools or instruments common to a given profession, demonstrate a knowledge of the proper care and use of the tools and instruments.

ITEM B - SELECTION OF TOOLS, EQUIPMENT, AND MATERIALS

27B.1 Given the name and description of a simple task and the applicable part of a manual or guide, determine:

a. the required tools, materials, and equipment;
b. the method or procedure to be used to perform the task;
c. the sequence in which the task should be performed.

27B.2 Find the relevant section of a manual and perform the above objective.

27B.3 Select the relevant manual from among several and perform the above task.

ITEM C - SELECTION OF PROCEDURES AND METHODS

27C.1 Given a random-order set of several tasks which are part of a simple and familiar job in which there is an obvious, inherent linear order (one task must be completed before the next task begins), relist the tasks in order of performance.

27C.2 Given a random-order set of several tasks which are part of a simple and familiar job in which there is an obvious, inherent non-linear order (two or more tasks which would be carried out during the same time frame), relist the tasks in order of performance, showing options where tasks can be carried out concurrently.

27C.3 Given a description of a familiar job, break it down into the major tasks and list the tasks in order of performance, showing options where tasks can be carried out concurrently.

ITEM D - ANALYSIS

27D.1 Establish a personal learning goal in measurable terms, and then list and prioritize the activities to be performed to achieve this goal.

27D.2 Analyze the results of the above objective in terms of meeting the stated goal and evaluate how each of the activities assisted in goal achievement.

Using the Back Up Items Book

Part of the Entry Standards Assessment system is the Back Up Items Book.

The Back Up Items Book contains two test tasks for each of the Instructional Objectives tested on any ESA.

The Back Up Items Book provides counselors an easy system for retesting clients who got an item wrong, but who probably really possess the skill.
For example, perhaps they

- didn't understand the task or
- needed only to be reminded of a simple process to be able to do the test task.

If a client has only a few problems, he/she should probably not be sent to BSBU.

In the case of someone who lacks only a few simple math skills, for example, it's more efficient to ask them to have a spouse or friend teach them the little they need and then return to the counselor, demonstrate the skill and pass into training.

The Back Up Item Book provides the parallel items the counselor needs to test in this way.

BSBU SKILL PROFILE REPORT

CLERICAL

Name _____

Counselor _____

WHOLE NUMBERS	
Identifying Math Symbols	
1A. Read, Write and Count	2-3-4-5
1B. Add and Subtract	1-2-3-4-5
1C. Multiply and Divide	1-2-3-4-5
1D. Combination of Function Problems	1
FRACTIONS	
2A. Read and Write	1a-1b-2-3-4-5
2B. Add and Subtract	1-3-5-8
2C. Multiply and Divide	1-2-3-4-5-6
DECIMALS	
3A. Read, Write and Count	1-2-3-4-5-6
3B. Add and Subtract	1-2-3-4
3C. Multiply and Divide	1-2-3-4-5-6-7
3E. Dollars and Cents	3-4-5
3F. Combination and Function Problems	1
PERCENT	
4B. Percentage Calculation	1-2-3
MIXED OPERATIONS	
5A. Convert Equivalents	1a-3a
MEASURE	
8A. Read Graduated Scales	3-4-5
DRAWINGS AND GRAPHS	
10A. Read Graphs	1

READING 1	
13A. Letters of the Alphabet	1-2
BASIC SIGHT WORDS	
15A. General Basic English	1-2-3
READING 11	
16A. Form	1-2-3-4
16B. Charts and Tables	1-2-3
16D. Manuals, Reference Books	1-2-3-4-5
16E. The Newspaper	2
17A. Literal Comprehension	1-3-5
BASIC WRITING SKILLS	
20A. Letters of the Alphabet	1
20C. Spelling	1-2
FORMS AND JOB APPLICATIONS	
22C. Grammar	1-25-36-39-40-42-35-37-3
22D. Short Notes	1
SPEAKING ABILITY	
25C. Use Telephone	1-4-5
25D. Give Directions	2

NOTE: X=SKILL ACCOMPLISHED

/=SKILL POSSESSED AT ENTRY.

Comments:

_____

_____

_____

_____

_____

_____

Copied and sent to:	At:	Date:
_____	_____	_____
_____	_____	_____
_____	_____	_____

BSBU SKILLS PROFILE

Name: _____ Preparing for Training in: _____ Date Entered: _____

Job Related Uses of These Skills:		INSTRUCTIONAL OBJECTIVE	AT ENTRY	DATE STARTED	DATE COMPLETE	# OF HOURS	COMMENTS	REVIEW
	Skill tested on ESA	1B.5 Solve a routine word problem using subtraction and/or addition of whole numbers.						
	Prerequisite	1B.4 Find the difference of two 1-5 digit numbers including cases where borrowing is required.						
	Prerequisite	1B.3 Perform subtraction of whole numbers given instructions such as: 8 - 5 = ___; $\begin{array}{r} 8 \\ -5 \end{array}$.						
	Prerequisite	1B.2 Find the sum of a set of whole numbers of 1-5 digits including cases where carrying is required.						
		1B.1 Perform additions of whole numbers given instructions such as: 8 + 5 = ___; $\begin{array}{r} 8 \\ +5 \end{array}$.						

Appendix E.
Sample page from Diagnostic Book

The Diagnostic Book contains 150 pages such as this one. Each instructional objective from the Taxonomy is given with all its prerequisites. This serves as a guide for the Basic Skills Brush Up instructor to diagnose the specific basic skills needed by each student.

Exercise to help you become familiar with the Taxonomy

Appendix F

Locate the Instructional Objectives in the taxonomy which express the skill necessary to complete the following operations:

	Instructional Objective
A. 9 x 4	
B. $\frac{1}{2} M V^2$ where M = 10 and V = 2	
C. Sort screws by size	
D. Identify "pre-" and "im-" as prefixes	
E. Add $2.00 and $5.50	
F. Complete a job application	
G. Identify a region on a map	
H. Identify the main idea of a paragraph	
I. Word problems involving finding per cent of a number	
J. Complete a purchase order	
K. Read a sales tax chart	
L. Read a road sign	
M. Write a sentence using "goose" as the subject followed by an active verb	
N. Read the measurements on a ruler	
O. Identify a 30° angle without a protractor	

lm / 7-14-78

ENTRY SKILLS

QUESTIONNAIRE

CETA STAFF DEVELOPMENT PROJECT

February 1979

To ENTER

your training program

which of these

SKILLS INVOLVING FRACTIONS

must the student have?

Appendix G

FRACTIONS

DIVIDE fractions, such as:

YES	NO
☐	☐

3 1/2 ÷ 2

30 ÷ 2 1/3

When do you DIVIDE fractions on this job?

What FRACTIONS are generally used?

104

If you checked YES, skip to page 20.

FRACTIONS

MULTIPLY fractions such as:

YES	NO

1/4 x 2 1/2 x 3

When do you MULTIPLY fractions on this job?

What FRACTIONS are generally used?

FRACTIONS

SUBTRACT fractions, such as:

	YES	NO
13 - 5 3/4	☐	☐
5 1/2 - 1 3/8	☐	☐

When do you SUBTRACT fractions on this job?

What FRACTIONS are generally used?

106

If you checked YES, skip to page 40 .

FRACTIONS

ADD fractions, such as:

YES	NO
☐	☐

2 3/4 + 7 1/8

When do you ADD fractions on this job?

What FRACTIONS are generally used?

If you checked YES, skip to page 40.

FRACTIONS

ARRANGE fractions in order by size, such as:

YES	NO
☐	☐

Arranging different-sized wrenches in order:

1/2 9/16 5/8 1 1/8

When do you ARRANGE fractions in order on this job?

What FRACTIONS are generally used?

If you checked YES, skip to page 40.

FRACTIONS

Represent PARTS OF A WHOLE as fractions, such as:

YES NO

3 work days out of 5 = 3/5 time

When do you use FRACTIONS on this job?

Are there any other skills in this area you'd like to add?

To ENTER

your training program,

which of these

SKILLS INVOLVING PERCENTS

must the student have?

iii

PERCENT

DETERMINE A NUMBER when a percent of it is known, such as:

YES	NO
▱	▱

5 % of _____ = 50

How is this calculation used on the job?

PERCENT

CALCULATE what percent one number is of another, such as:

YES NO

12 is _____ % of 60.

How is this calculation used on the job?

If you checked YES, skip to page 70 .

PERCENT

CALCULATE a percent of a number, such as:

YES	NO
☐	☐

15 % of 20 is _____.

How is this calculation used on the job?

Are there any other skills in this area you'd like to add?

To ENTER

your training program

which of these

SKILLS INVOLVING DECIMALS

must the student have?

DECIMALS

Use DECIMALS other than dollars and cents?

YES ☐ NO ☐

117

If you checked NO, skip to page 105.

DECIMALS

DIVIDE decimals, such as:

	YES	NO
	☐	☐

.26) 520 26) 5.20

What SIZE decimals are generally used?
(Give number of decimal places).

When do you DIVIDE decimals on this job?

If you checked YES, skip to page 105.

DECIMALS

MULTIPLY decimals, such as:

YES	NO
☐	☐

$$\begin{array}{r} 3.614 \\ \times\ .23 \\ \hline \end{array}$$

What SIZE decimals are generally used?
(Give number of decimal places).

When do you MULTIPLY decimals on this job?

If you checked YES, skip to page 105.

DECIMALS

SUBTRACT decimals, such as:

YES	NO
☐	☐

```
 402.35
-  16.87
```

What SIZE decimals are generally used?
(Give number of decimal places).

When do you SUBTRACT decimals on this job?

If you checked YES, skip to page 105.

DECIMALS

ADD decimals, such as:

YES	NO
☐	☐

```
 23.14
  4.25
+11.06
------
```

What SIZE decimals are generally used?
(Give number of decimal places).

When do you ADD decimals on this job?

If you checked YES, skip to page 105.

DECIMALS

ARRANGE decimals in order, such as:

	YES	NO
	▱	▱

.25 .04 1.03 .4 1.26

to: .04 .27 .4 1.03 1.26

What SIZE decimals are generally used?
(Give number of decimal places).

When do you ARRANGE decimals in ORDER on this job?

DECIMALS

Use DECIMALS in the form of dollars and cents.

YES ☐ NO ☐

123

If you checked NO, skip to page 130.

DECIMALS

DIVIDE amounts of MONEY, such as:

	YES	NO
If 25 items cost $20, what is the cost of one item?	☐	☐

When do you DIVIDE amounts of MONEY on this job?

How LARGE are the amounts of money generally used?

0-$100	$100-$1,000	over $1,000
☐	☐	☐

If you checked YES, skip to page 130.

DECIMALS

MULTIPLY amounts of MONEY, such as:

YES	NO
☐	☐

Find the total cost of
25 items that cost
$1.50 each.

When do you MULTIPLY amounts of MONEY
on this job?

How LARGE are the amounts of money
generally used?

0-$100	$100-$1,000	over $1,000
☐	☐	☐

If you checked YES, skip to page 130

DECIMALS

SUBTRACT amounts of MONEY, such as:

YES ☐ NO ☐

$57.30
- 5.15

When do you SUBTRACT amounts of MONEY on this job?

How LARGE are the amounts of MONEY generally used?

0-$100 ☐ $100-$1,000 ☐ over $1,000 ☐

If you checked YES, skip to page 130.

DECIMALS

ADD amounts of MONEY, such as:

YES	NO
☐	☐

$ .75
1.24
+ 12.61

When do you ADD amounts of MONEY on this job?

How LARGE are the amounts of money generally used?

0-$100	$100-$1,000	over $1,000
☐	☐	☐

DECIMALS

ROUND OFF decimals, such as:

	YES	NO
3.6145 to the nearest tenth	☐	☐
$105.628 to the nearest cent	☐	☐

Are there any other skills in this area you'd like to add?

To ENTER

your training program,

which of these

SKILLS INVOLVING CONVERSIONS

must the student have?

CONVERSIONS

Convert PERCENTS and DECIMALS, such as:

	YES	NO
25% = .25	☐	☐
.25 = 25%	☐	☐

When do you CONVERT percents and decimals on the job?

CONVERSIONS

Convert PERCENTS and FRACTIONS, such as:

	YES	NO
25% = 1/4	☐	☐
1/4 = 25%	☐	☐

What fractions are generally used?

When do you convert percents and fractions on the job?

CONVERSIONS

Convert FRACTIONS and DECIMALS, such as:

	YES	NO
1/8 = .125	☐	☐
.2 = 1/5	☐	☐

What fractions are generally used?

When do you convert fractions and decimals on the job?

Are there any other skills in this area you'd like to add?

To ENTER

your training program

which of these

SKILLS INVOLVING WHOLE NUMBERS

must the student have?

135

WHOLE NUMBERS

DIVIDE numbers, such as:

	YES	NO
$12\overline{)53}$ = 4 remainder 5	☐	☐
$12\overline{)48}$ = 4	☐	☐

What SIZE numbers are generally used?

1-100	100-1,000	over 1,000
☐	☐	☐

When do you use DIVISION on this job?

If you checked YES, skip to page 205.

WHOLE NUMBERS

MULTIPLY numbers, such as:

	YES	NO
13704 x 32	☐	☐

What SIZE numbers are generally used?

1-100	100-1,000	over 1,000
☐	☐	☐

When do you use MULTIPLICATION on this job?

If you checked YES, skip to page 205

WHOLE NUMBERS

SUBTRACT numbers such as:

	YES	NO
12207 - 1914	☐	☐

What SIZE numbers are generally used?

1-100	100-1,000	over 1,000
☐	☐	☐

When do you use SUBTRACTION on this job?

If you checked YES, skip to page 205.

WHOLE NUMBERS

ADD numbers such as:

	YES	NO
12207 + 1914	☐	☐

What SIZE numbers are generally used?

1-100	100-1,000	over 1,000
☐	☐	☐

When do you use ADDITION on this job?

If you checked YES, skip to page 205.

WHOLE NUMBERS

COUNT and WRITE the total, such as:

	YES	NO
Count items in stock and enter on an inventory sheet.		

Why is COUNTING important on this job?

If you checked YES, skip to page 205.

WHOLE NUMBERS

READ and WRITE whole numbers in WORDS, such as:

YES	NO
☐	☐

ABC Bank _____ 19__

Pay to the order of _____ $____

Three hundred fifty-nine Dollars

_____

What SIZE numbers are generally used?

1-100	100-1,000	over 1,000
☐	☐	☐

When do you READ and WRITE numbers in WORDS on this job?

If you checked YES, skip to page 205.

WHOLE NUMBERS

COPY numbers, such as:

		YES	NO
		☐	☐
12,357	145	3,164,987	6,667

What SIZE numbers are generally used?

1-100	100-1,000	over 1,000
☐	☐	☐

When do you COPY numbers on this job?

WHOLE NUMBERS

ROUND OFF numbers, such as:

	YES	NO

96 rounds off to 100

19 rounds off to 20

WHOLE NUMBERS

SOLVE problems STATED IN WORDS rather than numbers, such as:

	YES	NO
A box contains 48 items and 16 are left. How many have been used?	☐	☐
How many parts were used this week, if there are 15 in a box and 24 boxes were used?	☐	☐
If 112 boxes of papers arrive and must be divided among seven departments, how many boxes will go to each department?	☐	☐

Please give sample WORD PROBLEMS from this job:

Are there any other skills in this area you'd like to add?

To ENTER

your training program

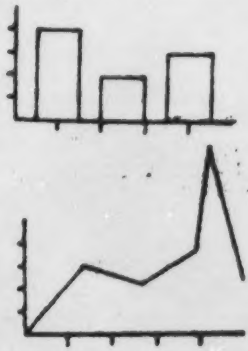
which of these

SKILLS INVOLVING GRAPHS

must the student have?

GRAPHS

Read data from GRAPHS, such as:



YES NO

When do you READ graphs on the job?

What kind of information is given on GRAPHS generally used?

147

Are there any other skills in this area you'd like to add?

To ENTER

your training program

which of these

SKILLS INVOLVING CHARTS AND TABLES

must the student have?

143

CHARTS and TABLES

Find information on CHARTS and TABLES, such as:

	YES	NO
Conversion tables	☐	☐
Mileage charts		
Weight tables		
Cost tables		

What CHARTS and TABLES do you generally use on the job?

Are there any other skills in this area you'd like to add?

To ENTER

your training program

which of these

SKILLS INVOLVING MEASUREMENT

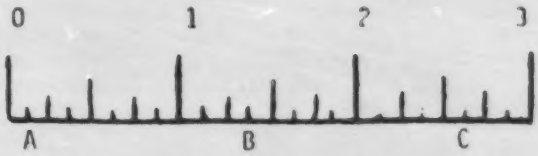
must the student have

MEASUREMENT

READ and RECORD measurements on a graduated scale, such as:

YES NO

YES NO



What kind of MEASUREMENTS are made on the job?

153

Are there any other skills in this area you'd like to add?

To ENTER

your training program

which of these

SKILLS INVOLVING TIME

must the student have?

155

TIME

SUBTRACT clock times, such as:

	YES	NO
Length of time between 9:30 a.m. and 3:45 p.m.	☐	☐

When do you SUBTRACT clock times on this job?

If you checked YES, skip to page 285.

TIME

Tell correct time.

YES NO

Are there any other skills in this area you'd like to add?

To ENTER

your training program

which of these

SKILLS INVOLVING FORMS

must the student have?

Write SENTENCES on forms, such as:

YES NO

DETAILS OF ACCIDENT

What FORMS are generally used on the job?
(Please provide samples.)

160

If you checked YES, skip to page 305.

Write WORDS, PHRASES and NUMBERS on forms, such as:

YES NO

☐ ☐

Name _____
Address _____
City _____ State ___ Zip _____

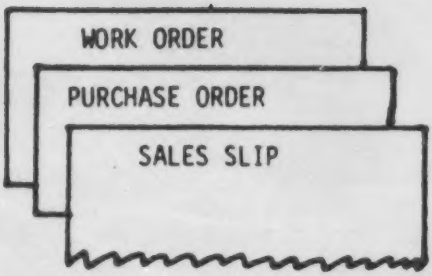
QUANTITY	ITEM	PRICE	TOTAL

What FORMS are generally used on the job? (Please provide samples.)

If you checked YES, skip to page 305.

READ forms, such as:

YES NO



What FORMS are generally used on the job?
(Please provide samples.)

Are there any other skills in this area you'd like to add?

To ENTER

your training program

what of these

READING SKILLS

must the student have?

READING

Read to FOLLOW DIRECTIONS, such as:

	YES	NO
work assignments	☐	☐
processing instructions	☐	☐
machine use	☐	☐

What kind of WRITTEN INSTRUCTIONS are used in the TRAINING PROGRAM?

When are WRITTEN INSTRUCTIONS used on the job?

READING

Read materials for INFORMATION, such as:

	YES	NO
textbooks	☐	☐
instruction sheets	☐	☐
letters	☐	☐
reports	☐	☐

What WRITTEN MATERIALS are used in the TRAINING PROGRAM? (Please give samples.)

What written materials are used on the job?

READING

Read to ANSWER QUESTIONS, such as:

	YES	NO
true/false	☐	☐
multiple choice		
short answer		

What kind of questions are used in the TRAINING PROGRAM?

To use these different materials, different kinds of reading tasks are involved, such as:

- Reading instructions
- Reading for information in text material
- Reading to find information in manuals and reference books

Please use the following pages to characterize the reading in your training course.

A. Must your students READ INSTRUCTIONS to carry out tasks, such as:

	Check if Applies
filling out forms	_____
answering test items	_____
operating machines	_____
repairing machines	_____

Are there other examples from your training?

How complicated are the instructions -

How many steps are usually involved?

Is technical vocabulary critical to understanding? (at entry level)

MANUALS and REFERENCE BOOKS

Locate information in a MANUAL using its table of contents or index.

YES ☐ NO ☐

What MANUALS are generally used on the job?

What information do you look up?

MANUALS and REFERENCE BOOKS

Use the DICTIONARY

YES NO

MANUALS and REFERENCE BOOKS

Look up addresses in TELEPHONE BOOK

YES ☐ NO ☐

Are there any other skills in this area you'd like to add?

How San Mateo County CETA Links BASIC SKILLS to JOB TRAINING

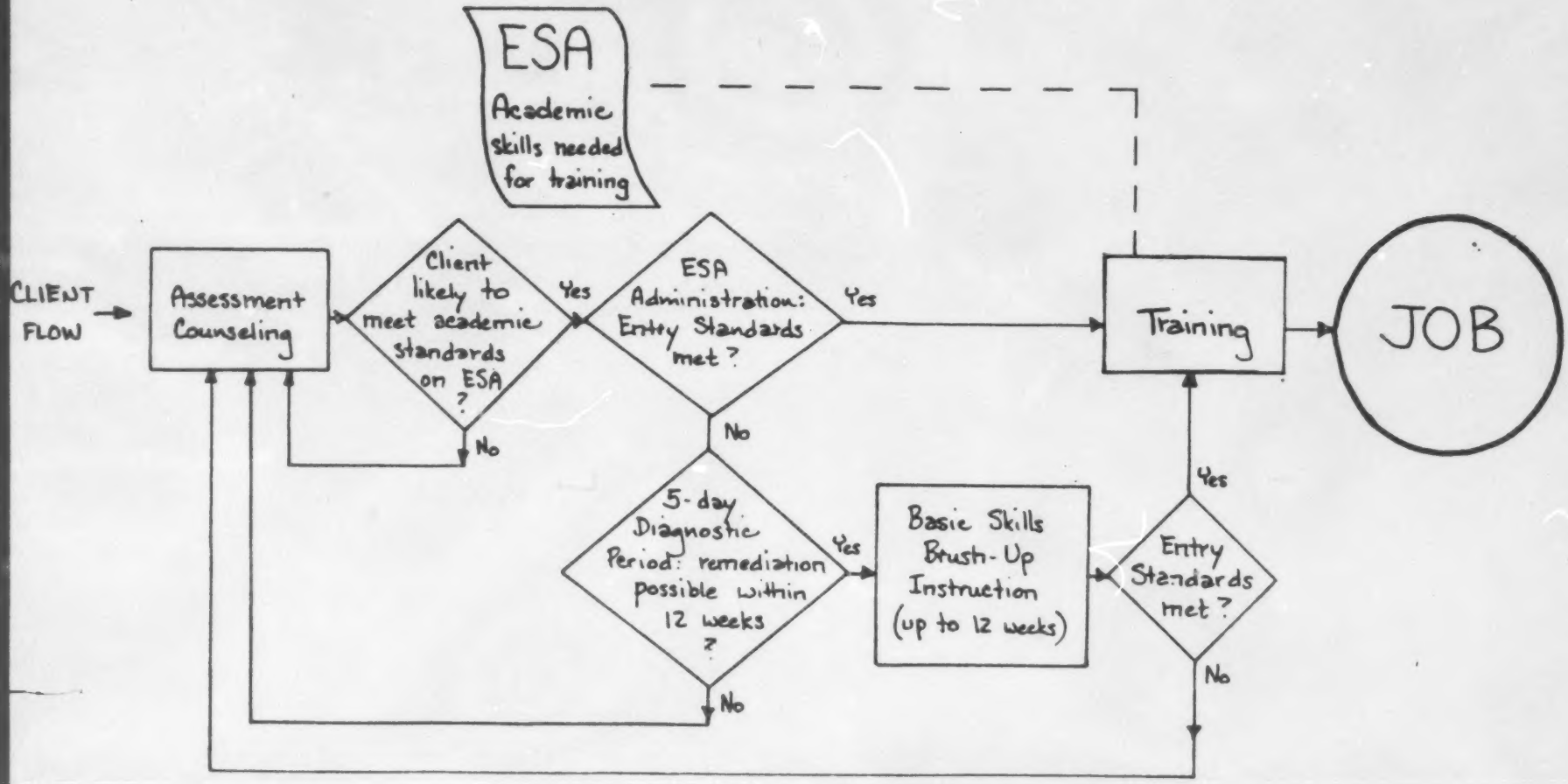
- The CETA Staff Development Project identified with the Training Units
  - the math and language skills needed for entry to each vocational training class, and
  - the job-related reasons for these skills.

- Entry Standards Assessments (ESA's), a set of criterion referenced tasks for each of the training programs funded by CETA were developed to
  - assess whether a client needs basic skills instruction prior to training,
  - specify the skills which become the goals of the client's instructional program.

- CETA established Basic Skills Brush Up Centers which provide
  - a structured diagnostic procedure to identify a client's instructional program, and
  - up to twelve weeks of individualized instruction directed toward the specified objectives of the client.

The result of the ESA/Basic Skills Brush Up process is a brief, job-related, individualized instruction program for CETA clients who lack the academic skills needed for training.

THE ENTRY STANDARDS ASSESSMENT (ESA) - LINKING PREVOCATIONAL EDUCATION TO JOB TRAINING



HOW THE ESA LINKS BASIC SKILLS TO JOB TRAINING

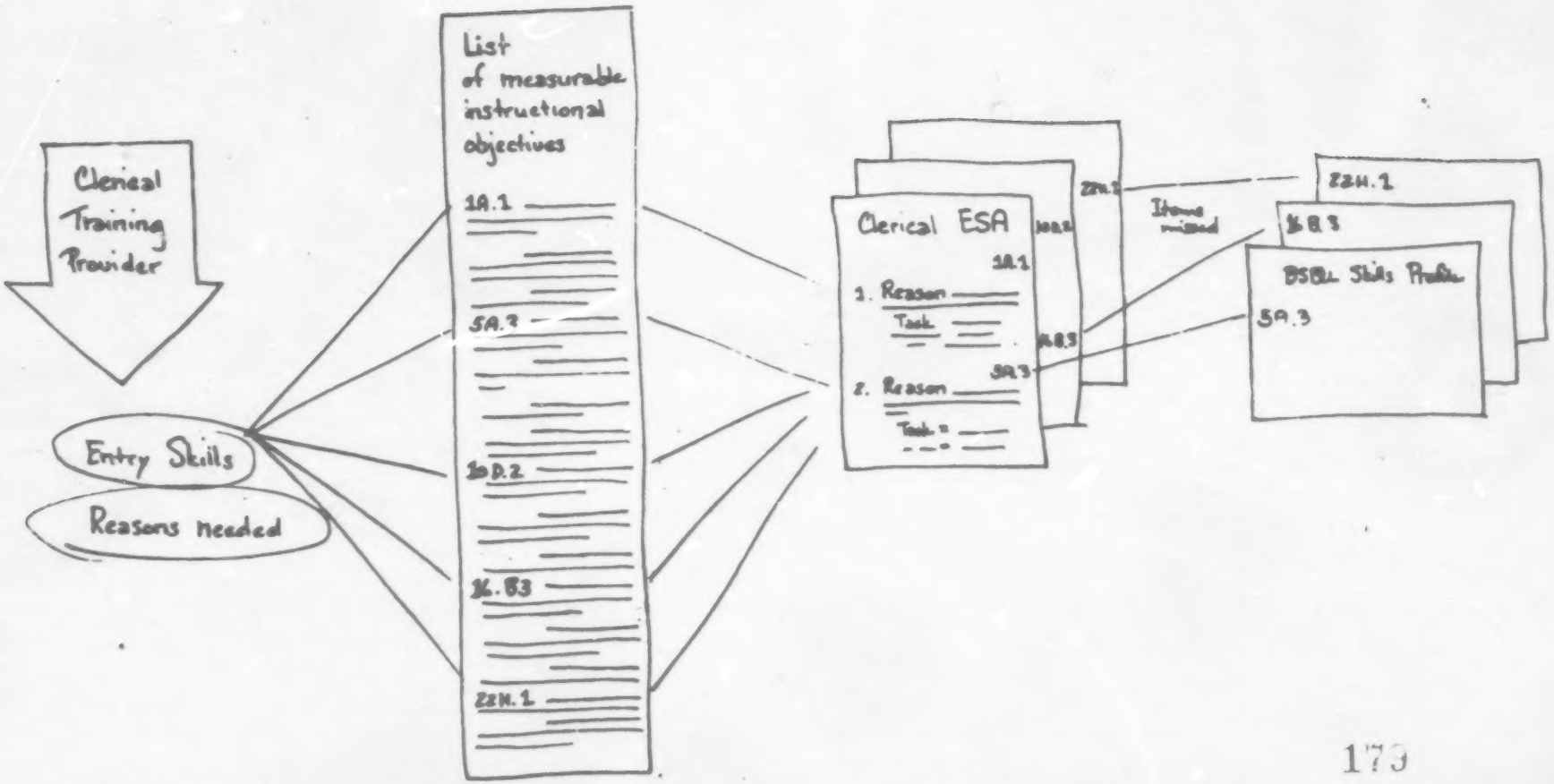
Interview training provider
- to identify skills needed for successful completion
- to identify reasons these skills are needed

Match skills to list of Instructional Objectives (IO's)

Write ESA competencies:
- Reason
  - Task to test IO
    - IO number

Administer ESA

Identify IO's of items missed as goals of individual Basic Skills Brush Up (BSBU) instruction



CETA Training Delivery System

Seven Employment Training Units (ETU's) subcontract with the Prime Sponsor to provide the following services to clients:

- recruitment
- assessment
- counseling
- placement in training
- placement on jobs

The ETU's refer CETA clients to eleven Training Units (TU's) who provide classroom instruction preparing CETA clients to enter the following fields:

- Clerical
- Waste Water Operator
- Office Machine Technology
- Solar Technician
- Machinist Apprentice
- Home Health Aide
- Electronics Assembler
- Retail Sales

Clients who do not have the math and language skills to succeed in job training are referred to Basic Skills Brush Up Centers for individualized short term programs. Three Basic Skills Brush Up Centers provide prevocational instruction for all eight training programs.

The CETA Staff Development Project is a project of the Career Preparation Centers, Vocational Education Division, San Mateo County Office of Education. The project is funded by CETA San Mateo County. Project staff members are: Joe Cooney, Director; Patricia Kurtz, Counselor; Susan Burgenbauch, Research Assistant; June Warden, Secretary.

Check The Items You Can Do

Electronics workers use a variety of charts.

12. Read the chart and answer the questions below in the spaces provided.

168.3

RESISTER COLOR CODE			
COLOR	FIRST NO.	SECOND NO.	MULTIPLIER
BLACK	NOT USED	0	X 1
BROWN	1	1	X 10
RED	2	2	X 100
ORANGE	3	3	X 1000
YELLOW	4	4	X 10,000
GREEN	5	5	X 100,000

a. What is the number for "yellow" in the "Second No." column?

b. What color has the number "2" in the "First No." column?

c. What color has the multiplier x1000?

Check The Items You Can Do

13. A salesperson must be able to fill out sales receipts for customers. Fill out the following sales slip using the information provided: (Use today's date)

22A.1

Customer: Mr. James Enders

Address: 561 Upland Drive
Oak City, Maryland

Merchandise sold: 1 wool shirt at $15.98
1 scarf at $4.50
2 pr. socks at $2 each

Sales Tax: $1.59

JAMESTOWN DEPARTMENT STORE

_____ 19__

Sold to _____

Address _____

_____ _____

QUAN.	DESCRIPTION	PRICE EACH	AMOUNT
	Tax		
	Total		

Positively no exchanges made unless this slip is presented within 10 days

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CSDP 10/79

THE BOOK OF ITEMS USED

The Book of Items Used is a compendium of all the criterion referenced test items we have used in any of the nearly 20 Entry Standards Assessments we have developed.

We use the Book of Items Used as a source of model test items when we are developing a new Entry Standards Assessment

If the reader is attempting to replicate the system described is this manual, he or she is invited to contact the author to secure this extensive file of items.

THE BACK UP ITEMS BOOK

As described in Appendix B, each CETA counselor has a book which contains two alternate test items for each test item in any test, The Back Up Items Book.

This book is a compendium of approximately 200 pages and is not included here due to its bulk.

If the reader is attempting to replicate the system described in this manual, he or she is invited to contact the author to secure this extensive file of items.

A SKILLS CHECK

This skills check is to help you and your counselor know if you have the math, reading, writing and listening skills needed for training for this job. The instructor of the course asks that you have these skills before coming to training. If you don't have these skills, we offer classes to help you learn them. You'll only work on the skills you'll need and then you'll move into training.

Relax. Take your time.

Don't worry. If you can't do it now, you will have the opportunity to learn.

NAME_____

COUNSELOR'S NAME_____ETU_____

DATE OF YES/NO REVIEW_____

DATE ESA COMPLETED_____

ADVANCED ELECTRONICS

ENTRY STANDARDS ASSESSMENT

Please note: Original copy is printed on 8½x11 size paper.

Entry Standards Assessment (E.S.A.)
for
ADVANCED ELECTRONICS COURSE
by Advancement Training Center

Check The Items You Can Do

Advanced electronics workers need to solve practical math problems on the job. To demonstrate your ability to do this, solve the following problems:

1. A particular door bell transformer requires twenty volts and will be powered by batteries. How many six volt batteries will the bell require?

_____ 1C.5

_____

Electronics workers frequently copy measurments given in fractions. To show your ability to wort with common fractions,

2. Arrange the following fractions in order from least to greatest:

$\frac{11}{8}$ $\frac{7}{8}$ $1\frac{5}{32}$ $\frac{13}{16}$ $\frac{1}{4}$ $\frac{9}{16}$ $\frac{27}{32}$

_____ 2A.5

___ ___ ___ ___ ___ ___ ___

Standards stipulated by Classroom Instructor
Developed by CETA Staff Development Project 3/80

Check The Items You Can Do

To work out formulas involving electrical measurements, advanced electronic workers must be able to work with decimal numbers.

3. Multiply the following numbers:

_____ 3C.1b

a. 37.6 x 1.02 = _____

b. 26.4 x 13.3 = _____

c. 130.5
x 7.25

To calculate how much current flows in a circuit, advanced electronic workers must be able to divide decimal numbers.

4. Divide the following: (to two decimal places)

_____ 3C.3

a. $15\overline{)68}$

b. $12\overline{).72}$

_____ 3C.4

c. $.29\overline{)5.28}$

d. $1.03\overline{)98.63}$

To determine the efficiency of electrical equipment, it is necessary to figure the percentage of power used for the amount of power applied. To show your ability to work in percentages, solve the following problems:

5. a. 6% of 225 = _____

_____ 4B.1

b. 25% of _____ = 23

_____ 4B.3

Check The Items You Can Do

6. Convert the following percents to decimals: _____

a. 5% = _____ b. 80% = _____ 5A.3a

Exact timing is very important in electronics work.

7. Determine how long a process took if it started at 11:35 a.m. and ended at 12:15 p.m. _____

6G.1

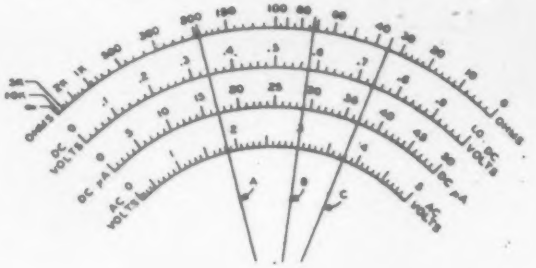
_____

Check The Items You Can Do

Electronics workers carry small rulers with them and use them frequently. They need to be able to read graduated scales quickly.

8. Read the measurements indicated by letters on the meter below: _____

8A.5b & d



a. Measurement (a) on the OHMS scale: _____

b. Measurement (b) on the AC VOLTS scale: _____

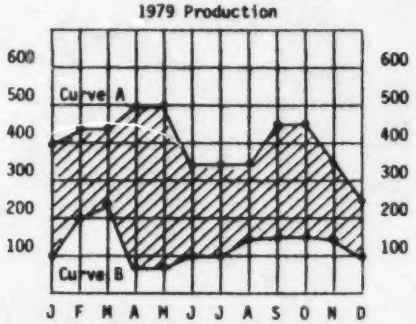
c. Measurement (c) on the DC VOLTS scale: _____

Check The Items You Can Do

Electronics workers read machines and blueprints which contain information in line graphs.

9. Using the following graph, answer the questions below:

10A.1



Curve A: C. B. Radios
Curve B: Car Radios

1. In February, approximately how many more C. B. Radios were produced than Car Radios?

2. During what month were the fewest C. B. Radios produced?

3. Overall production was lowest during which two months?

Check The Items You Can Do

To compare work with military or commercial standards, an advanced electronics worker may need to use reference tables.

10. To show you can use common reference tables, use the table below to answer the following questions:

168.3

COPPER WIRE TABLE

AWG*	Diameter in Mils	Area Circular Mils	Ohms per 1000 Feet (20°C)
16	50.8	2583	4.08
17	45.3	2048	5.00
18	40.3	1624	6.39
19	35.9	1288	8.05
20	32.0	1021	10.15
21	28.5	810	12.80
22	25.4	643	16.14
23	22.6	510	20.36
24	20.1	405	25.67
25	17.9	321	32.37
26	15.9	254	40.80
27	14.2	202	51.47
28	12.6	160	64.90
29	11.3	127	81.84
30	10.0	101	103.20
31	8.9	80	130.10
32	8.0	63	164.10
33	7.1	50	206.90
34	6.3	40	260.90
35	5.6	32	329.00
36	5.0	25	414.80
37	4.5	20	523.00
38	4.0	16	660.00
39	3.5	12	832.00
40	3.1	10	1049.00

*American Wire Gage

a. What is the diameter of a 28 AWG wire?

b. What gage wires allow between 32-51 OHMS/1000 ft.?

c. What would be the Area Circular Mils of a wire which has a diameter of 10 Mils?

Check The Items You Can Do

To use unfamiliar machines or to troubleshoot a problem a machine has, advanced electronics workers need to look up information in the machine's manual.

11. Use the table of contents below to answer the following questions:

16D.3

TABLE OF CONTENTS

ELECTROMECHANICAL DESIGN
Power Supply Design 55- 56
Terminal Board 57- 58
Chassis Detail 59
Assembly Drawing 60- 61

WIRING DIAGRAMS
Introduction 62
Power Supply 63

INTERCONNECTION DIAGRAMS
Audio System 64
Digital Computer System 65

PICTORIALS
Pictorials 66- 69

LOGIC DIAGRAM
Logic Symbol Familiarization 69- 70
Logic Diagram 71

INTEGRATED CIRCUIT
Integrated Circuit Introduction 72
Integrated Circuit Outline - Dual-In-Line . 73
Functional Elements Familiarization 74
I.C. Design Layout Requirements 75
Dual-In-Line Layout Technique 76
I.C. Design Layout - Five Dual-In-Line . . 77
14-Pin I.C. Flat Package - Outline 78
Flat Package I.C. Hook-up 79

APPENDIXES
A Component Symbols 80- 84
B Component Outline 85- 93
C Hardware 94-100
D Screw Clearance and Hole Chart 101

a. What page gives details about assembly drawings?

_____

b. What page would you start on to answer a simple question regarding integrated circuits?

_____

c. What chapter would you look in to find information on the Dual-in-Line Layout Technique?

_____

Check The Items You Can Do

Advanced electronic workers need to read frequently, particularly when they are in training.

12. To demonstrate your ability to understand technical materials, read the following passage and answer the questions below:

17A.5

17A.3

Basic Electricity

More than two thousand years ago the Greek philosopher Thales observed that when a piece of amber, a hardened gum from trees, was rubbed with a material like wool or fur, it attracted certain other kinds of material. This ability to attract (and also to repel, as it was later discovered) other objects is due to electric charge. The phenomenon itself came to be called static electricity. "Electricity" comes from the Greek word for amber. "Static" indicates that the charge remains stationary; that is, it remains bound to the material that has been charged.

They could not answer the seemingly simple question, "What is electricity?". This questions is still unanswered. Though electricity might be defined as "that force which moves electrons," this would be the same as defining an engine as "that force which moves an automobile." The effect has been described, not the force.

Presently little more is known than the ancient Greeks knew about the fundamental nature of electricity, but tremendous strides have been made in harnessing and using it. Elaborate theories concerning the nature and behavior of electricity have been advanced, and have gained wide acceptance because of their apparent truth and demonstrated workability.

From time to time various scientists have found that electricity seems to behave in a constant and predictable manner in given situations, or when subjected to given conditions. These scientists, such as Faraday, Ohm, Lenz, and Kirchhoff, to name only a few, observed and described the predictable characteristics of electricity and electric current in the form of certain rules. These rules are often referred to as "laws". Thus, though electricity itself has never been clearly defined, its predictable nature and easily used form of energy has made it one of the most power sources in modern time. By learning the rules, or laws, applying to the behavior of electricity, and by understanding the methods of producing, controlling, and using it, electricity may be "learned" without ever having determined its fundamental identity."

*Advancement Training Corporation's Basic Electricity

Check The Items You Can Do

12. (continued)

	True	False
a. The word 'electricity' comes from the Greek word for stationary.	____	____
b. Today we know little more than the Greeks did about the fundamental nature of electricity.	____	____
c. Little progress can be made until we understand the nature of electricity.	____	____
d. The main idea of the selection is that by learning the rules applying to the behavior of electricity we may "learn" electricity without ever having determined its fundamental identity.	____	____

13. Listen to your counselor read the following words and write them down using correct spelling.

20C.1 III

_____

_____

_____

_____

_____

_____

_____

_____

COUNSELOR's COPY

Check The Items You Can Do

13. Spelling - Read the following words and sentences to the client.

20C.1 III

accounting	He took an accounting course at night.
knowledge	She gained knowledge and insight from working at the other firm.
secretary	The secretary kept the minutes from the meeting in a separate file.
various	The new company had various problems getting started.
advantage	His neatly typed resume gave him a clear advantage over the other two candidates.
agreement	It was only after two months of negotiation that the union and management reached agreement.
obtain	He will obtain the materials as requested.
accept	She needs to consider the idea before she can accept it.

Check The Items You Can Do

On your job, you may fill out forms to request electrical parts.

14. Using the information given, fill out the supply request form below. Use your own name and today's date.

22A.1

You work in the Processing Department and need to order parts. They must be received by one week from today. The order is to be charged to account number 187456. The parts you need are:

10 high voltage diodes at $1.28 each,
200 fuses at $ .02 each, and
15 integrated circuits at $ .17 each.

supply request

NAME		REQUEST DATE
DEPT.	ACCOUNT NUMBER	ORDER DATE

QUANTITY	DESCRIPTION	Unit Cost

Check The Items You Can Do

For reporting progress in production and to keep track of electronic components, electronics workers need to fill out a variety of forms.

15. To demonstrate your ability to do this, fill out the portion of the accident form which follows, using the information below. (Use your own name and today's date.)

22B.1

You fell off a ladder two days ago at your work-site, Room 7, Building 203, XYZ Electronics Corporation.

Time: 5:22 PM
Injury to you: Broken arm
Injury to others: None
Property involved: Faulty ladder
Circumstances: Repairing air-conditioning unit

Accident Report Form

(Name of Injured Person) (Room No.) 19 (Date Report Made)

(Residence) (Zip) (Telephone) (Date of Birth)

SPECIFIC FACTS CONCERNING THE ACCIDENT

Fill in all spaces — Give Details - Use Reverse side if necessary

Accident Date: _____ Hour: ___ (A.M.) (P.M.) Day of Week: _____

Place of Accident: _____

Nature of Injury: _____

Describe the Accident fully (in complete sentences):

Employee's Signature: _____

A SKILLS CHECK

This skills check is to help you and your counselor know if you have the math, reading, writing and listening skills needed for training for this job. The instructor of the course asks that you have these skills before coming to training. If you don't have these skills, we offer classes to help you learn them. You'll only work on the skills you'll need and then you'll move into training.

Relax. Take your time.

Don't worry. If you can't do it now, you will have the opportunity to learn.

NAME_____

COUNSELOR'S NAME_____ETU____

DATE OF YES/NO REVIEW_____

DATE ESA COMPLETED_____

OICW CLERICAL

ENTRY STANDARDS ASSESSMENT

200

ENTRY STANDARDS ASSESSMENT (E.S.A.)

for

OICW CLERICAL TRAINING*

Check The Items You Can Do

Identify the following signs to your counselor. (What do you do?) _____

+ = _____ - = _____

• or x = _____) or ÷ = _____

1. To keep track of supplies on hand or hours on time sheets, office workers may need to add or subtract fractions.

   Solve the following problems and write in simplest form: _____

   (a) 3 1/8 + 5 3/8 = _____ 2B.3

   (b) 6 1/3 + 4 1/2 + 5 5/6 = _____

   (c) 8 - 4 3/8 = _____ _____

   2B.8

2. Some office workers must be able to maintain simple budget records. To demonstrate the ability to perform this task, solve the following additions: _____

(1)	(b)	
$20.85	$149.95	3E.3
14.95	57.65	
6.75	20.50	
+ 2.55	89.88	
	+ 17.49	

3. Office workers must be able to keep track of expenditures for requisitions and petty cash. To demonstrate the ability to perform this task, do the following subtraction problems: _____

(a)	(b)	
$25.00	$487.16	3E.4
- 6.75	- 29.87	

*Standards stipulated by classroom instructor
Developed by CETA Staff Development Project
Revised 11/79

Check The Items You Can Do

4. Most workers must be able to calculate the cost of supplies needed. To demonstrate the ability to perform this task, perform the following multiplication problems:

(a) $16.95 x 25 (b) $80.25 x 18

_____ 3E.5

5. If a man earns $6.275 per hour, find his total take-home pay if he works 8 hours on Monday through Thursday and 7.5 hours on Friday and his total deductions are $50.63.

_____ 3F.1

6. Clerical workers must be able to calculate sales tax, discounts and rates. To demonstrate this ability, please solve the following problems:

(a) 5.5% of 8.75 = _____ _____ 4B.1

(b) 12 is _____% of 60? _____ 4B.2

(c) 25% of _____ = 23. _____ 4B.3

7. The company you work for gives a 9% raise each year. If you are now making $8,500 a year, how much will you be making in two years?

_____ 4C.1

Check The Items You Can Do

7. To use a calculator or a ten-key adding machine, you must be able to convert fractions to decimals. Change each of the fractions below to a decimal: (If it doesn't come out exactly, write out each decimal to four places.)

(a) 1/2 = _____ (b) 1/8 = _____

(c) 1/5 = _____ (d) 1/3 = _____

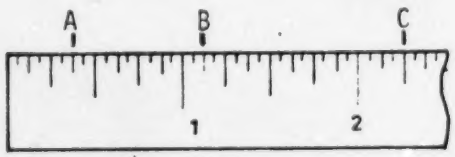
5A.1a

9. To calculate with percentages, you will have to convert them to decimals. Change each of the following percentages to decimals:

(a) 25% = _____ (b) 8½% = _____ (c) 123% = _____

5A.3a

10. To set up a page of typing, an office worker may need to use a ruler. Give the measurements in inches shown by the letters on the ruler below:



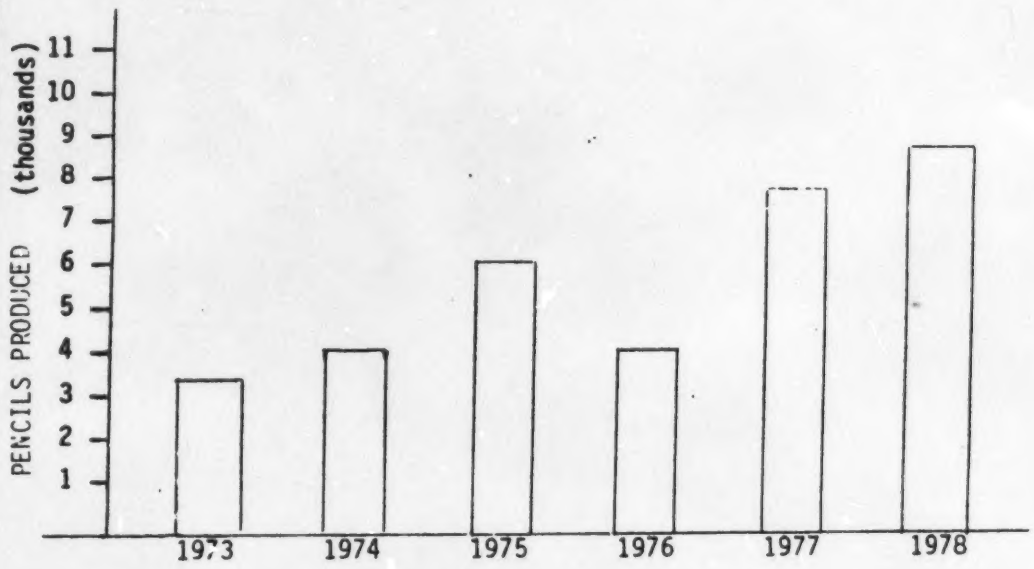
A = _____ B = _____ C = _____

8A.5c

Check The
Items You
Can Do

11. Look at the graph below and answer the following questions: _____

10A.1



(a) Which year had the highest production? _____

(b) How many pencils were produced in 1977? _____

Check The
Items You
Can Do

12. Clerical workers must work with a variety of forms. Read the following supply request and answer the questions below:

16A.4

NAME	PHONE/EXT.	REQUEST DATE	ORDER DATE
J. Alfred Prufrock	3299	12/20/76	1/7/77
PROGRAM	ACCOUNT NUMBER	APPROVED BY	
MERMAID	123-146F-137632-1404	T. S. Eliot	

QUANTITY	DESCRIPTION	ACCOUNTING USE ONLY Unit Cost	
25	Blue 3-Ring Binders, Size 8½x11		

Delivery Date _____ Received By _____ Total Cost _____

(a) How many binders are needed? _____

(b) When were the binders requested? _____

(c) What program will use the binders? _____

(d) Who approved the request? _____

Check The Items You Can Do

13. Clerical workers will often consult tables and charts to find prices and other information. Examine the following chart and answer the questions below:

16B.3

Weight (up to)	100 miles	200 miles	300 miles	400 miles	500 miles
5 pounds	$5.40	$5.40	$5.40	$5.40	$5.40
10 pounds	5.40	5.40	5.60	5.90	6.10
15 pounds	5.60	5.90	6.20	6.50	6.80
20 pounds	5.90	6.20	6.50	6.80	7.10
30 pounds	6.00	6.40	6.80	7.20	7.60
40 pounds	6.10	6.60	7.10	7.60	8.10
50 pounds	6.20	6.85	7.50	8.15	8.80
75 pounds	7.00	7.85	8.70	9.55	10.40
100 pounds	7.50	8.60	9.70	10.80	12.00

(a) What is the charge for sending a 30-pound parcel 400 miles?

_____

(b) How much would it cost to send an 8-pound box 200 miles?

_____

Check The Items You Can Do

14. Read the following want ads and answer the questions below:

_____

16E.2

1. **CLERK**
Real estate organization firm located in San Mateo seeks individual who enjoys working with numbers & has good 10 key skills. Immediate opening. Will train. 574-4930. EOE

2. **CLERK TYPIST**
qualified typist. Full time or part time U.S. citizenship req. Call Ms. Eggleston at 556-0980 bef. noon. U.S. Environmental Protection Agency, 215 Fremont St. SF EOE

3. **Receptionist/Secretary**
Western region office of nat'l firm, needs bright, energetic person to handle light secretarial work for executives, handle incoming calls, distribute mail, typing & filing. $800-$1000 + excel. fringes. Apply to:
Royal Tallow & Soap
P.O. Box 24407
429 Amador St. (at Pier 92)
San Francisco, CA 94124
647-4890

4. **RECEPTIONIST**
Garment co needs person w/good personality & phone voice typ req'd. Exc benefits. Zarin corp. 552-4300, 165 8th St., S.F.

5. **TYPIST** Mag. Card Operator Gen'l clerical $o. SF. Call E. Rousand, 871-9234

6. **WORD** Processing Operator Trainee; must type 65 +, good machine transcription and grammar skills. For appt. call 772-2312. Equal oppty employer M/F/H. AMPAC

(a) What kind of organization wants someone who enjoys working with numbers?

_____

(b) What does EOE mean in ad number 2?

_____

(c) Which job requires good machine transcription?

_____

15. Read the paragraph below and tell the instructor what the main idea is:

_____

17A.3

Within the fast-growing clerical field, receptionist employment is expected to grow rapidly. This is largely because so many receptionists work for firms providing business, personal, and professional services -- a sector of the economy which is expected to show very strong growth in the future. In addition, more and more firms recognize the importance of the receptionist in promoting good public relations. Also, because the receptionist's work is of a person-to-person nature, it is unlikely to be affected by office automation.

Check The Items You Can Do

16. Read the passage below and answer the following questions: _____

17A.5

Georgia works for the Donne Compass Company, Inc., in New London, Connecticut. She is a Typist Clerk II in the accounting department. Her duties involve typing budget reports, filling out ledger entries, and typing letters for her boss, Mr. Dryden. Georgia has been on this job for two years and hopes to be promoted to a Typist Clerk III soon. If she gets her promotion, her salary will increase from $785 a month to $895 per month.

(a) Where is the Donne Compass Company located?

_____

(b) What is Georgia's job title?

_____

(c) How much money does Georgia make each month?

_____

17. Check the groups of words which are NOT complete sentences. _____

22C.1

_____ Office workers enjoy busy, exciting careers.

_____ The more rewarding the job.

_____ Her machine at the end of the period.

_____ Bill placed the paper in the machine.

_____ Al, a clever repairman, and his tools.

_____ Lola covered her machine at the end of the period.

Check The Items You Can Co

18. Underline the correct word in parenthesis: _____

(a) Neither of the men (is, are) working. 22C.25d

(b) There (was, were) five books on the shelf.

(c) (Don't, Doesn't) he know how to do it?

(d) A group of girls, including my sister, (is, are) going to Europe this summer.

19. Fill in the blanks. (The first two lines are examples.) _____

Ex:	I sing	I sang	I will sing	I have sung
Ex:	I speak	I spoke	I will speak	I have spoken
(a)	I choose	I chose	I will choose	I have _____
(b)	I begin	I began	I will begin	I have _____
(c)	I drive	I drove	I will drive	I have _____
(d)	I eat	I ate	I will eat	I have _____
(e)	I throw	I threw	I will throw	I have _____

22C.26

20. Add punctuation as needed to the following sentences: _____

(a) Vera my best friend lives in San Jose 22C.35

(b) Johns dog chased its tail 22C.38

(c) I enjoyed reading the book didnt you 22C.42

(d) Bill tried hard however he finally had to give up 22C.34

21. Which of the following is wrong? _____

_____ He hurried home. He was not too late. 22C.36

_____ She answered the telephone; no one was there.

_____ He typed fast; therefore, the letter was finished on time.

_____ They stopped by yesterday, we had gone out.

Check The Items You Can Do

22. Underline the letters which should be capitalized: _____

22C.39

(a) the president of the school board is dr. matthews.

(b) our professor made us read the lesson in french.

(c) the early pioneers crossed the mississippi river and the rocky mountains.

(d) peru, bolivia and equador are spanish-speaking countries.

(e) irving berlin wrote the song, "white christmas".

23. Underline the correct word choice: _____

22C.40

(a) Sew the (lose, loose) button on this shirt.

(b) (Whose, Who's) book is this?

(c) I am taking a (coarse, course) in English.

(d) We took a coffee (brake, break).

(e) I (lay,laid) down to rest yesterday afternoon.

24. Underline the correct word or words in parenthesis: _____

22C.43

(a) (She and I, She and me) are good friends.

(b) My brother loaned the car to (him and I, him and me).

(c) The boys and (we, us) are going.

(d) She is as smart as (I, me).

(e) No one looked as pretty as (she, her).

(f) He is the man (who, whom) I most respect.

(g) (Who, Whom) did you say was coming?

Check The Items You Can Do

25 Write the address of the following companies, using the San Mateo County Telephone Directory: _____

Fremont Indemnity 25C.5

_____

Hong Kong Restaurant

_____

Stacey's Book Store, San Francisco

_____

26. Underline the correct spelling: _____

(a) I will (reccomend, recommend) him for the job. 20C.1

(b) Henry is (fourty, forty) years old.

(c) Some people expect special (privileges, priviledges).

(d) He took aspirin to (releive, relieve) his headache.

(e) The car is (equiped, equipped) with deluxe features.

27. Listen to the following words and write them down using correct spelling: _____

(dictate 10 words here) 20C.2

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

Check The Items You Can Do

28. Office workers must be able to take phone messages. Listen to the following message and write a short note containing the important points:

22D.1

DATE _____ HOUR _____

TO _____

WHILE YOU WERE OUT

M _____

OF _____

PHONE _____
AREA CODE PHONE NUMBER

TELEPHONED		RETURNED CALL		LEFT PACKAGE	
PLEASE CALL		WAS IN		PLEASE SEE ME	
WILL CALL AGAIN		WILL RETURN		IMPORTANT	

MESSAGE _____

SIGNED _____

The AICO-UTILITY Line Form No. 55-046

29. Explain to your counselor how to get to OICW from your house.

25D.2

Check The Items You Can Do

27. Word list, with sentence using each word for spelling dictation. _____

secretary	Ask the secretary for an appointment.	20C.2
business	A new business just opened next door.	
sincerely	Close the letter with 'Very sincerely yours'.	
February	The bill came last February.	
truly	He signed the letter 'Yours truly, Bill'.	
calendar	Did you get the new calendar for next year?	
license	Your driver's license has expired.	
unnecessary	An extra copy is unnecessary.	
preferred	She preferred to call early.	
proceed	Now that we have the order number, we can proceed with the delivery.	

28. Office workers must be able to take phone messages. Listen to the following message and write a short note containing the important points: _____ 22D.1

This is John Jones of the Perry Manufacturing Company. Would you please have Mr. Nelson call me between 9:00 and 11:00 o'clock tomorrow morning. My phone number is 616-1778, extension 429. Thank you.